output solutions

User's Manual

C-650 Plus

Acknowledgements

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Great care has been taken to ensure that the information in this publication is accurate and complete. However, should any errors or omissions be discovered or should any user wish to make suggestions for improving this manual, please feel encouraged to send us the relevant details.

The contents of this manual are subject to change without notice.

Safety Regulations

The printer **C-650 Plus** fulfill the safety regulations according to DIN EN 60950-1 for computer systems.

The mains cable must be connected to a ground protected wall-socket. The selected voltage of the printer needs to fit to the local voltage.

The power plug must be easily accessible at any time so that it can be disconnected immediately in case of danger or for maintenance purposes.

Comme le câble de secteur sert de dipositif d'arrêt-urgence, sa connexion à l'imprimante doit être tout le temps accessible.

Before installing the printer, check the surrounding conditions in which the printer will be placed (see next page, Operating Environment).

During a thunderstorm you should never attempt to connect or disconnect any data transfer cables.

The power supply should only be opened and checked by authorized personnel. Repairs and maintenance may only be attempted by authorized personnel as well. Repairs done inappropriately may cause damage and severe danger for the user.

General Installation Precautions
To ensure optimum printer functionality and to avoid making service calls for problems that are not directly caused by the product itself, bear in mind the information provided in the following sections.

Electrical Power Supply
Make sure that the electrical wall outlet to which the printer is connected has a valid ground and that it is able to supply the power needed by the machine. A wall outlet without ground can cause functional problems and can be a safety hazard.

Do not plug the printer to electrical wall outlets that are already being used by equipment that could cause electrical noise and excessive voltage fluctuations (fans and air conditioners, large photocopiers, lift motors, TV radio transmitters and signal generators, high frequency safety devices, and so on).

Common office equipment (calculating machines, typewriters, small photocopiers, terminals and personal computers) can share the same outlet as long as they do not cause excessive electrical noise.

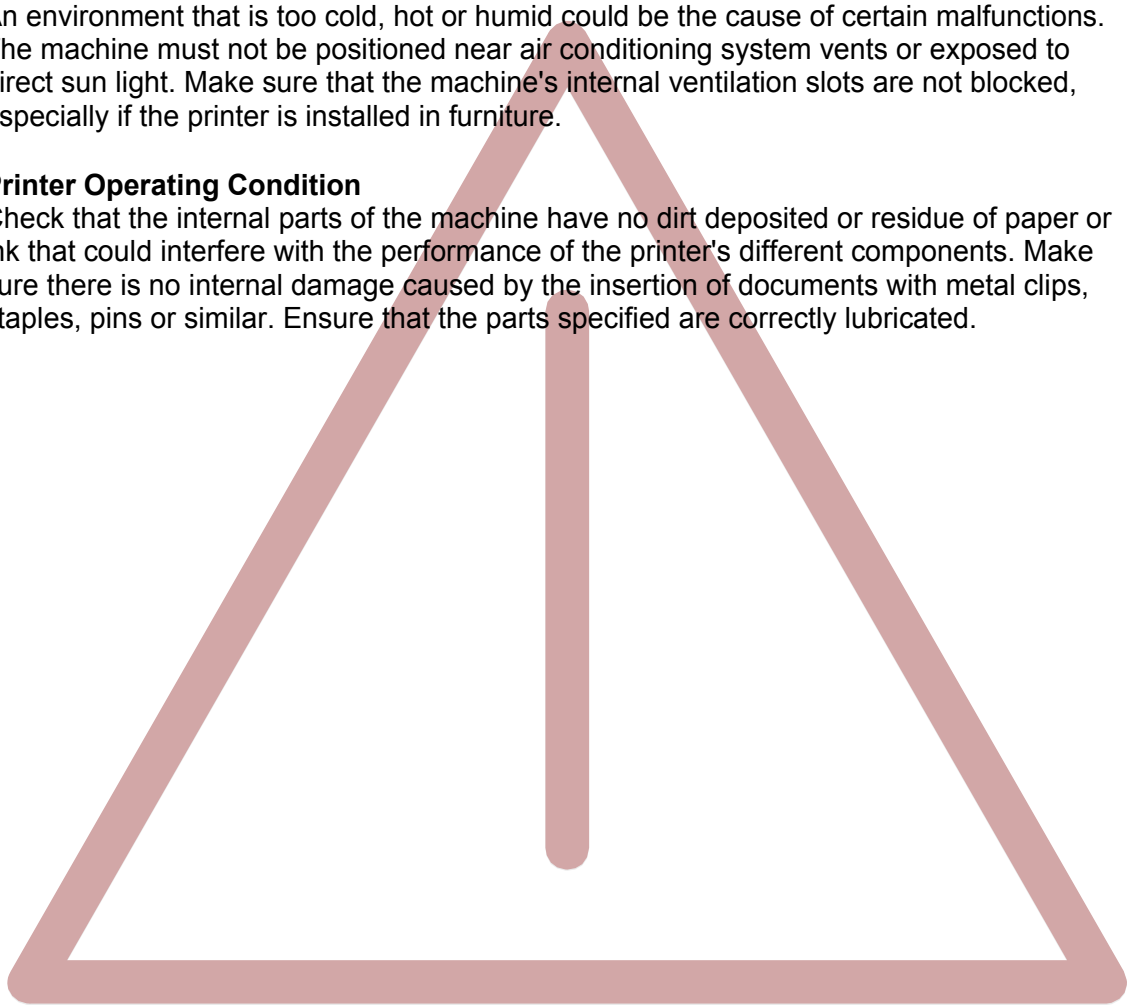
Environmental Conditions
The environmental conditions in which the product can work properly referring to a normal air-conditioned office environment (environmental temperature of 15 up to 35 °C, relative humidity of between 15 and 85%).

During machine storage and operation, make sure that condensation does not form as the result of extreme environmental variations. Dust, dirt and smoke can cause the parts in motion to wear excessively, short circuits (in the presence of a high degree of humidity). High temperatures and low humidity can cause problems due to static electricity.

Locating the Machine
- The printer must be installed on a flat, vibration free surface.
- Do not position the machine near air conditioning systems, heat sources or in direct sunlight.
- Do not obstruct the printer's ventilation slots.
- If the printer is installed in a cabinet, make sure that it has good ventilation so as to avoid overheating.
- Install the printer in a position so that paper jams can be cleared easily.

Work Environment
An environment that is too cold, hot or humid could be the cause of certain malfunctions. The machine must not be positioned near air conditioning system vents or exposed to direct sun light. Make sure that the machine's internal ventilation slots are not blocked, especially if the printer is installed in furniture.

Printer Operating Condition
Check that the internal parts of the machine have no dirt deposited or residue of paper or ink that could interfere with the performance of the printer's different components. Make sure there is no internal damage caused by the insertion of documents with metal clips, staples, pins or similar. Ensure that the parts specified are correctly lubricated.



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Preface

About this Manual
This manual covers the printer in combination with an interface module.

The interface is an integral part of the printer, and the type of interface used significantly influences the behaviour or operation of the printer.

The structure of this manual is such that the operator is led step-by-step through the various procedures. It starts with the unpacking and setting-up, moves on to detailed instructions for operating the printer and ends with the mounting of options.

The manual is divided into the following chapters:

1. **Getting Started**
   This chapter covers the unpacking and setting-up of the printer and the installation of the ribbon cassette. By the end of this chapter the printer should be fully functional and tested in its primary form. It is not yet connected to the host computer system and no options are mounted.

2. **Operating the Printer**
   This chapter discusses in great detail the operation of the operator panel, all menu functions, and the general operation of the menu.

3. **Configuring the Printer**
   This chapter explains how to configure the printer so that it can communicate with the corresponding system environment. Then this chapter thoroughly describes the printer's operating controls. In the last part you will find tables with the possible values of the menu items.
   In this chapter you will also find a detail explanations of individual menu items.

4. **Maintenance**
   This chapter shows how to clean the printer and how to remove the Alignment Unit.

5. **Options**
   This is a description of the available options, the Tractor Unit and the USB Port.

6. **Technical Data**
   All technical details or data about the printer can be found here.

7. **Interface Description**
   This chapter gives hints about possibilities to connect the printer to the various computer systems and explains particularities depending on the version of the operating system. Additionally, cable connection is illustrated.

8. **Firmware Update**
   Output Solutions will advise users to update the printer’s firmware irregularly to strengthen C-650 PLUS’s functions.

9. Trouble Shooting and Diagnostics
Suggests how to identify and correct simple problems.

Appendix

A. Character Set Table
All printer supported character sets are listed in this chapter.

B. IBM ProPrinter Emulation Commands
Quick reference for IBM ProPrinter X24 and IBM ProPrinter II

C. EPSON LQ Emulation Commands
Quick reference for EPSOM LQ Emulation.

Conventions Used in this Guide
The following conventions are used:

Bold	Headlines and important information.
Note:	Contains special advice to facilitate handling.
Caution:	Contains important information to prevent damage of the equipment.
[STOP □]	Key functions are always depicted in brackets.

Abbreviations and Acronyms

DRAFT	**Draft** Quality
HSD	**H**igh **S**peed **D**raft
LCD	**L**iquid **C**rystal **D**isplay
LED	**L**ight **E**mitting **D**iode
LQ	**L**etter **Q**uality
MACRO	User defined group (1 up to 3) of stored parameter
NLQ	**N**ear **L**etter **Q**uality
PH	**P**rint **H**ead

1. Getting Started

1.1 Unpacking

Check each item against the check list detailed below. Contact your supplier immediately if any item is missing or damaged.

1.1.1 Delivery Contents Printer C-650 Plus

Check each item against the check list detailed below. Contact your supplier immediately if any item is missing or damaged.

- Printer **C-650 Plus** (1)
- Power Cord (2)
- C-650 PLUS Cartridge (Ribbon Cassette) (3)
- Printout of the User's Manual (4)
- Printout of the default menu configuration (5)
- CD-ROM with a PDF format of the User's Manual and additional information (6)

1.2 Requirements to the Location of the Printer

Environmental Conditions

This printer is designed to be installed in a typical office environment. We claim that customer must follow these operation explanation as below for printer's well working status and safety of operator:

- Install the printer in an area away from any heat source, air conditioner, or strong airflow.
- Avoid installing the printer where it is exposed to moisture or heat (eg. direct sunlight).
- Avoid installing the printer in a dusty or humid environment.
- Do not put printer to the high temperature, shake or wet environment. And no exposure to direct sunlight. For example boiler, humidifier or fridge.
- Position the Printer on a stable level surface.

Preconditions for Installation

- Place the printer on the stand or a table.
- When processing fanfold paper always place the printer with its front edge slightly off the edge of the table.

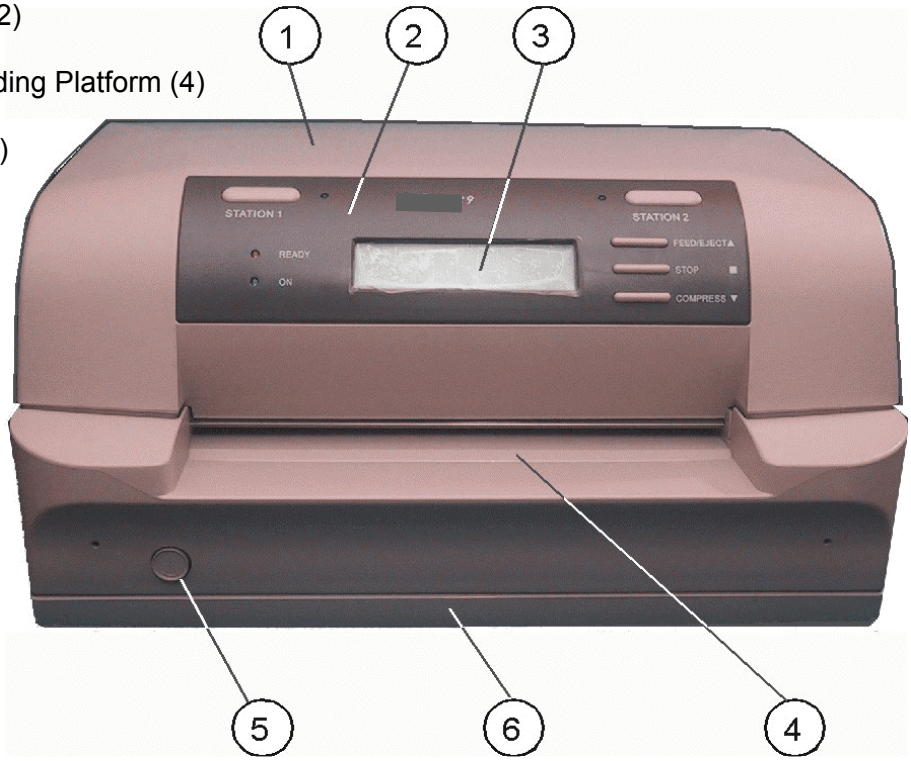
Power Requirements

- No special wiring is required. A typical office wall outlet is sufficient. Make sure that the electrical wall outlet to which the printer is connected has a valid ground and that it is able to supply the power needed by the machine.
- Do not plug into the same wall outlet other equipment besides the printer such as coffee machines, copy machines, or air conditioners.

1.3 A First Look at the Printer

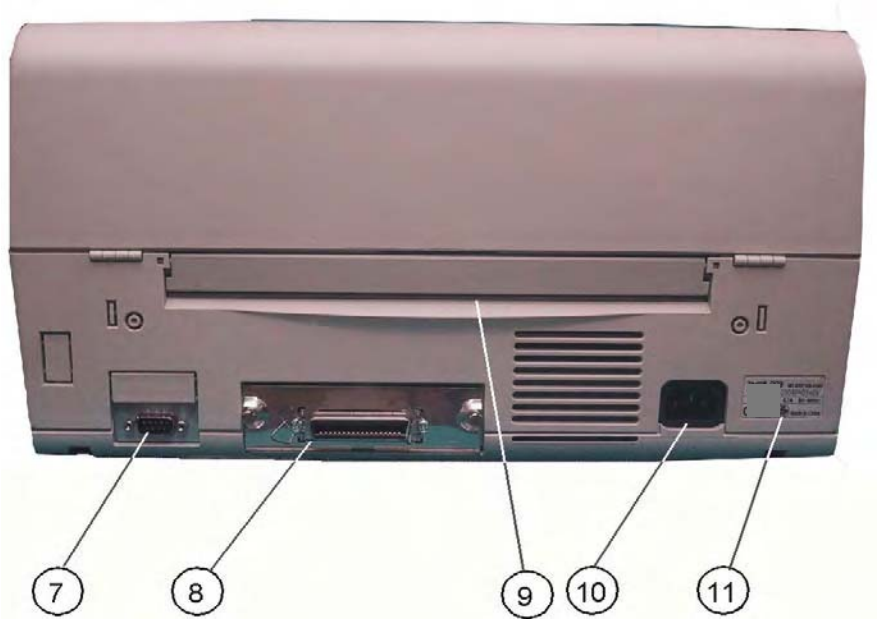
1.3.1 Front View

- Top Cover (1)
- Operator Panel (2)
- Display (3)
- Front Paper Feeding Platform (4)
- Power Switch (5)
- Bottom Frame (6)



1.3.2 Rear View

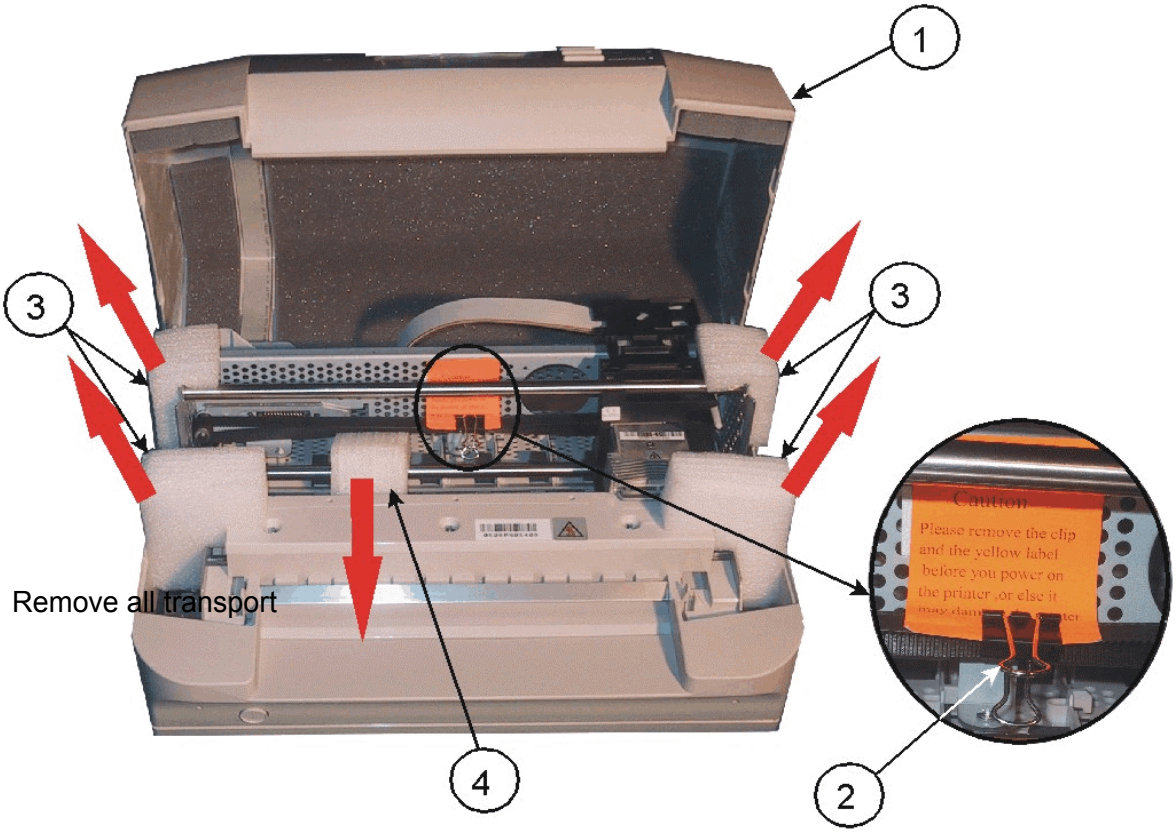
- Serial Interface Connector (7)
- Option Interface Board Slot (8) for detail see chapter 5 **Options**
- Rear Paper Feeding Path (9)
- Power Cord Socket (10)
- Electrical Label (11)



1.4 Remove Transport Lock

Note: Please do not connect the printer's power cord at this moment, otherwise the printer may be damaged permanently.

- Open the top cover (1) first.
- Remove the black iron clip (2) and yellow label, from the print head carriage.
- Take out the four foam-rubber cushions (3) which on the both sides of carriage.
- Remove the foam-rubber cushions (4) to the front by lifting up.



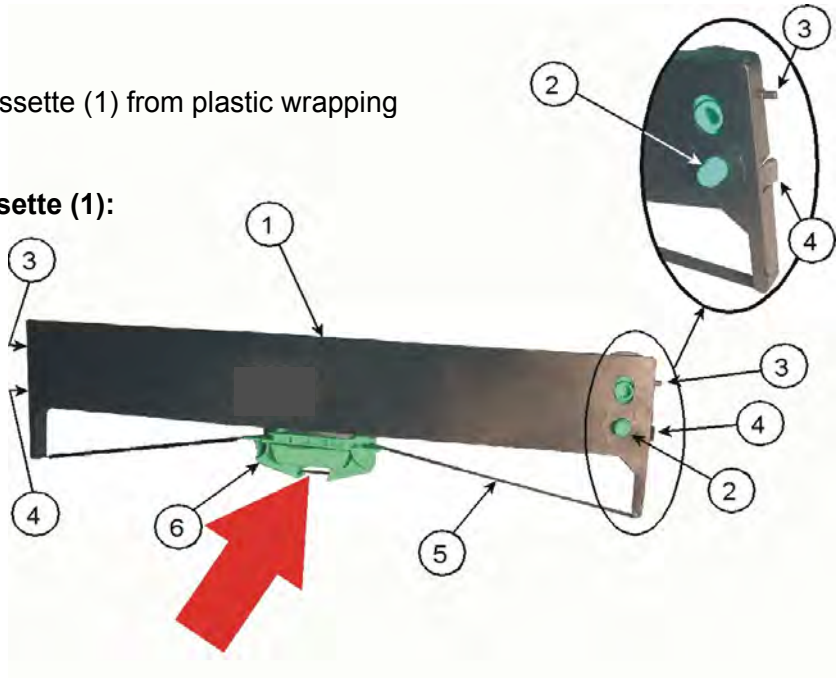
Remove all transport

Re-packing Information
To ensure maximum protection when transporting the printer, always:

- Remove the mains cable.
- Remove the ribbon cassette.
- Reposition the transport lock.
- Pack the printer in its original packing material and ship in its original package.

1.5 Ribbon Installation

- Take out the Ribbon Cassette (1) from plastic wrapping

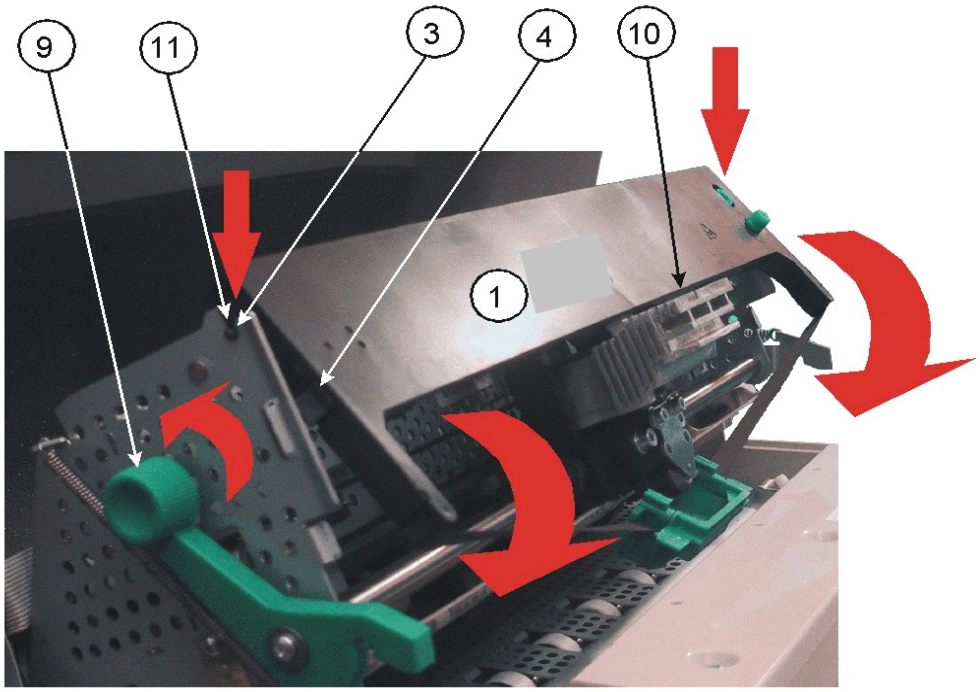


Details of the Ribbon Cassette (1):

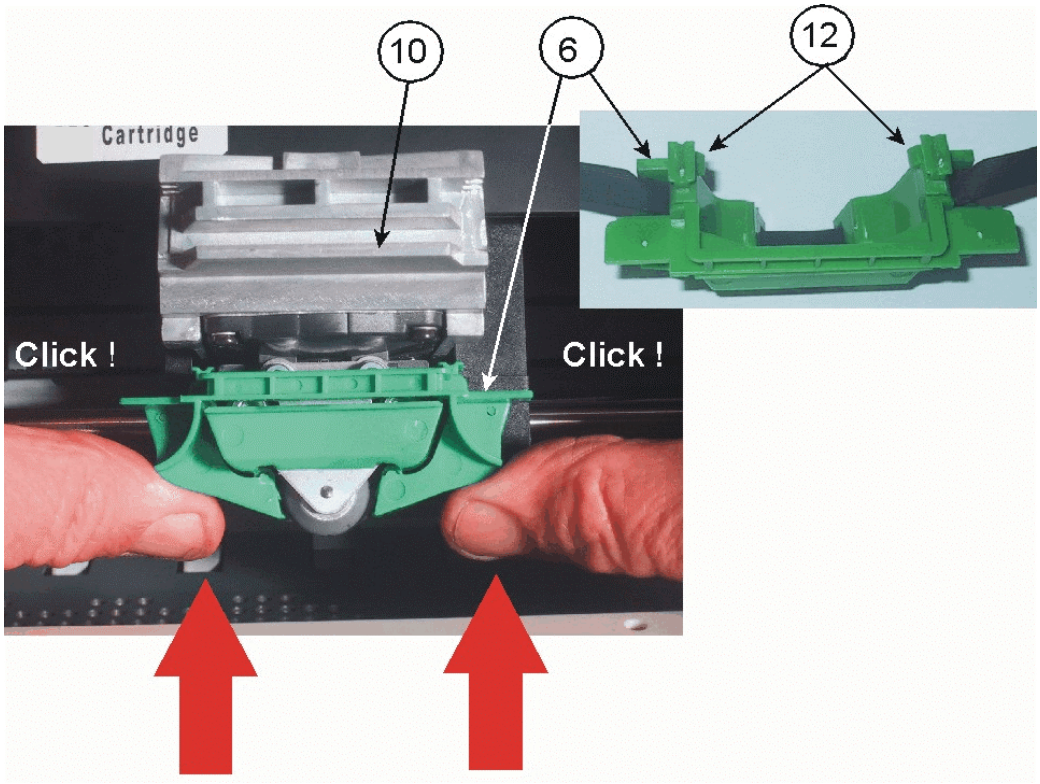
- Active Wheel (2)
- Fixation Pin (3)
- Fixation Block (4)
- Ribbon (5)
- Ribbon Guide (6)

Installing:

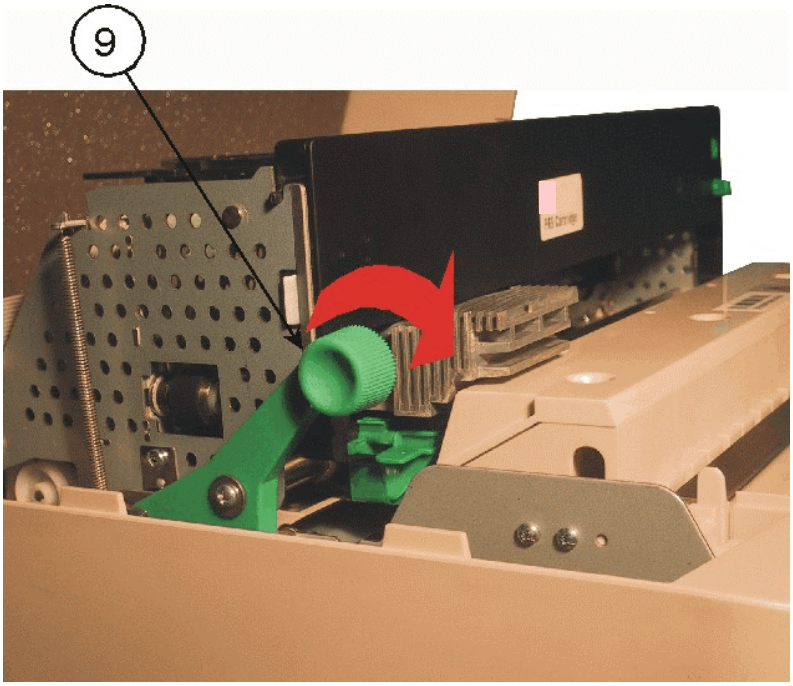
- Power the printer on.
- Remove the Ribbon Guide (6) by sliding down from the Ribbon Cassette (1).
- Open top cover.



- Swivel the green print unit lift handle (9) backwards to lift the print unit entirely.
- Move print head (10) to the centre.
- Insert the fixation pins (3) at the both ends of ribbon cassette (1) into the slots (11) at both ends of print unit frame.
- Try to push ribbon cassette (1) by rotation as shown in the picture above.
- Press the ribbon cassette fixation block (4) into both ends slot of print unit until you hear a "**CLICK**".



- Insert ribbon guide (6) into print head (10) and press it up to make sure that the two taps (12) on the ribbon guide (6) have been fixed.
- Move the print head (10) to the right and left side until the ribbon is tight.

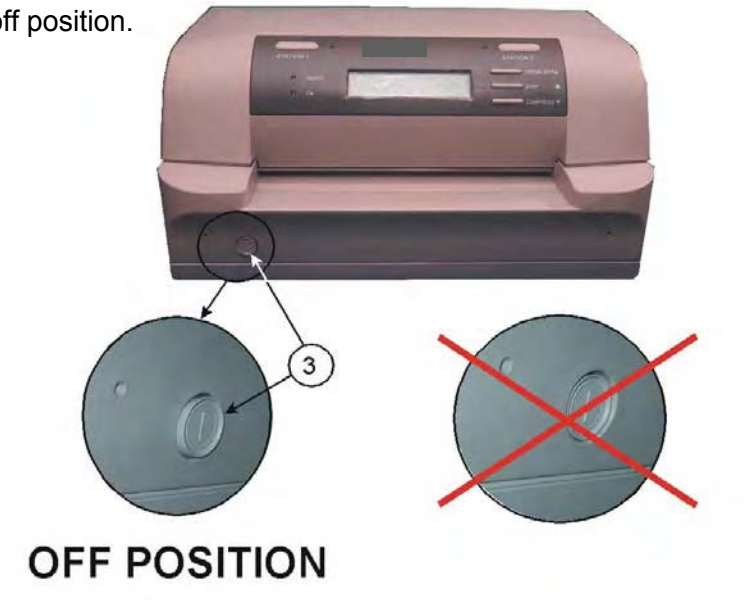


- Swivel the green print unit lift handle (9) to let print unit back to its normal Position.
- Close top cover.

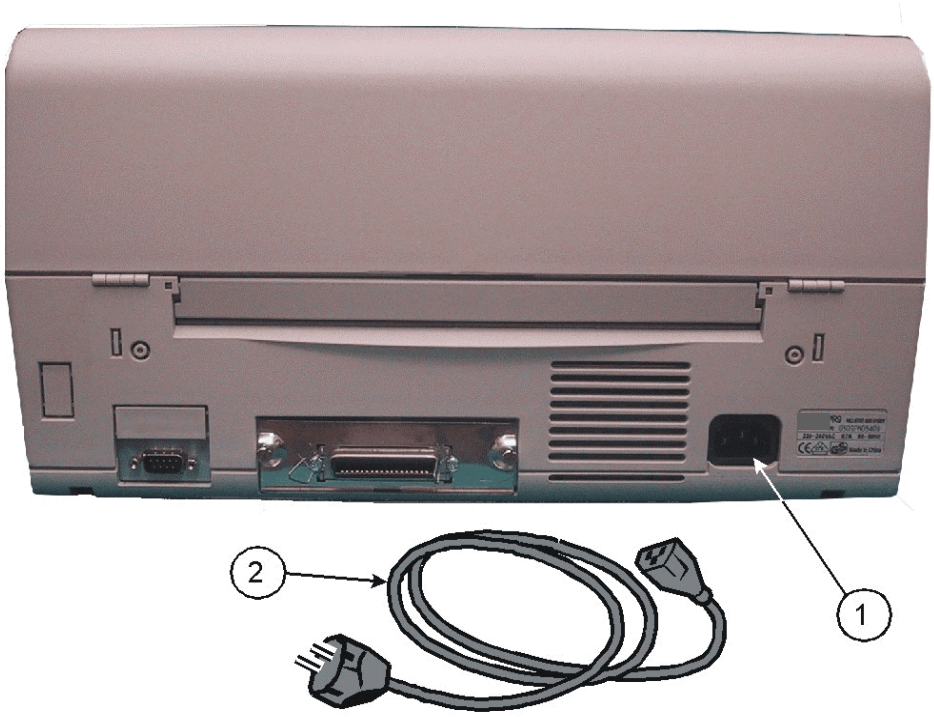
1.6 Mains Connection and Power On

WARNING: Before plug the power cord into the electrical wall outlet and power on the printer, voltage rating indicated on the electrical data plate must be checked to correspond to the local mains.

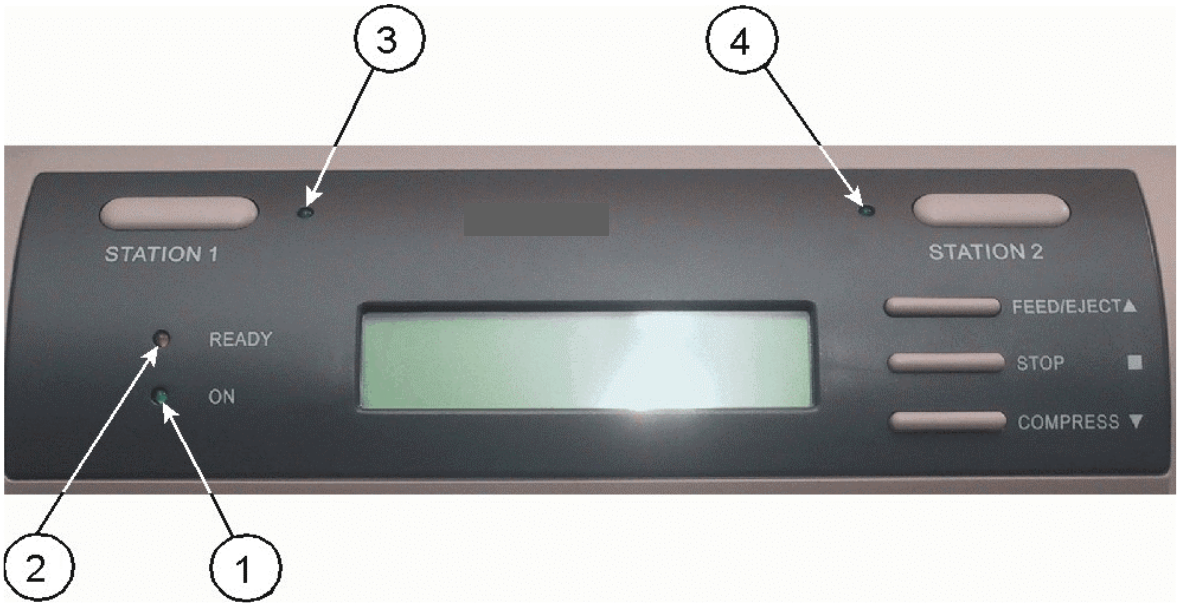
Note: Power switch (3) must be in off position.



- Connect the printer to the mains using the power cord (2).
- First connect the cable to the power cord socket (1) and then to the mains.
- Do not plug into the same wall outlet other equipment besides the printer such as coffee machines, copy machines, or air conditioners.



The operator can press down front power switch (3 in figure before) to power on printer now.



After power on:

- The **ON** (1) indicator will be light up
- After a short delay the **READY** (2), **STATION 1** (3), and **STATION 2** (4) indicator will be all lighted.
- Several seconds later the print head start initialization action. You hear a sound of the movement.
- Only **ON** indicator will be light after initialization has been finished.

Note: Any printing medium in the printer paper path will be ejected.

The display shows the message: **CX LQ**
ON-LINE

The informations shown by the LCD are either factory default or related to the selected micro.

1.7 Print Test

1.7.1 Selftest

The following steps show which keys to use to start a test printout.

KEY / or action	**DISPLAY**
[STATION 2] and **[COMPRESS** —] (synchronously)	OFF-LINE MODE MENU SETUP
[COMPRESS —**]**	OFF-LINE MODE MENU PRINTING
[STOP #**]**	MENU PRINTING INSERT A4 SHEET
After feeding an A4 paper the printer will start process automatically if the operator put the print medium into the paper feeding path. The user needn't align the print medium with the left or right border of the printer. The printer itself will look after the alignment.	MENU PRINTING PRINTING; WAITING...
If printing finished, printer will eject paper.	MENU PRINTING PRINTING; WAITING...
[STATION 2]	MENU PRINTING FINISH; PRESS STAT2
[STATION 2]	OFF-LINE MODE MENU PRINTING
[STATION 2] and **[COMPRESS** —] (synchronously)	⏻ CX LQ1600K ON-LINE

Note: A sample of the Menu Printing you will find on the next page.

1.7.2 Selftest Printing Contents

For different menu setup configuration, there will be different printed out selftest printing contents. Concerning your printer's menu configuration please refer to printer packing enclosed sheet.

```
K10-P   VER2.11 T18   N1  FPGA. 2.5  CCG. GB18030   CG. 003
PRINTER ID: 00000B692E2D01

NEEDLES TEST:

                                                                  | |
                          1 1 1 1 1 1 1 1 1 1 2 2 2 2 2           O E
1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4                   D V

CURRENT USER: MACRO1
```

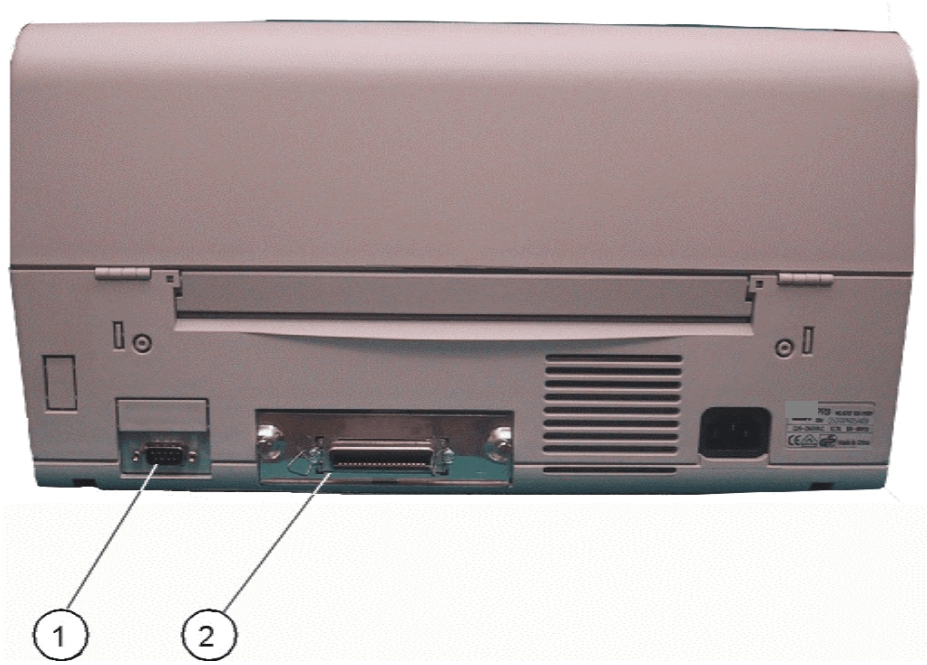
	MACRO1*	MACRO2	MACRO3
CONFIGURE			
RESUME DEFAULT VALUE:	NO	NO	NO
INTERFACE:	CX	CX	DUAL INTERFACE
RS1 EMULATION:	LQ1600K	OLI	IBM
MODIFY RS1 CONFIG:	NO	NO	NO
BAUD RATE(RS1):	9600	9600	9600
BITS/CHARACTER(RS1):	8	8	8
PARITY(RS1):	NONE	NONE	NONE
STOP BITS(RS1):	1	1	1
DSR(RS1):	NO	NO	NO
CX EMULATION:	LQ1600K	IBM	LQ1600K
PAPER EMPTY WARNING:	YES	YES	YES
CX STROBE EDGE:	RISING EDGE	RISING EDGE	RISING EDGE
RS2 EMULATION:	OLI	OLI	OLI
MODIFY RS2 CONFIG:	NO	NO	NO
BAUD RATE(RS2):	9600	9600	9600
BITS/CHARACTER(RS2):	8	8	8
PARITY(RS2):	NONE	NONE	NONE
STOP BITS(RS2):	1	1	1
DSR(RS2):	NO	NO	NO
RS SWITCH MODE:	MANUAL	MANUAL	MANUAL
USB EMULATION:	OLI	OLI	OLI
SB CURRENCY SYMBOL:	YES	YES	YES
DRAFT SPEED:	NORMAL	NORMAL	NORMAL
LQ TYPE:	NLQ1	LQ2	LQ2
NEEDLES SWITCH:	YES	YES	YES
SPECIAL FORMS:	NO	NO	NO
BIM DIRECTION:	UNIDIRECTION	UNIDIRECTION	UNIDIRECTION
IGNORE COVER OPEN:	NO	NO	NO
NEEDLE COMPENSATION:	NO	NO	NO
HS COMPENSATION:	NO	NO	NO
BROKEN NEEDLE NO.:	1	1	1
PNS SELECTION:	YES	YES	YES
PNS #2000K:	SINGLE SHEET	SINGLE SHEET	SINGLE SHEET
PNS #2001K:	400	400	400
PNS #2002K:	NO	NO	NO
PNS #2003K:	NO	NO	NO
PNS #2004K:	205mm	205mm	205mm
PNS #2005K:	NO	NO	NO
PNS #2006K:	NO	NO	NO
PNS #2007K:	NO	NO	NO
OPTION TRACTOR			
TRACTOR MODE(RS1):	MANUAL	MANUAL	MANUAL
TRACTOR MODE(CX):	MANUAL	MANUAL	MANUAL
TRACTOR MODE(RS2):	MANUAL	MANUAL	MANUAL
TRACTOR MODE(USB):	MANUAL	MANUAL	MANUAL
PAGE LENGTH(1"):	11	11	11
PAGE LENGTH(1/60"):	0	0	0
TOP ADJ(1/20"):	0	0	0

1.7.3 Dr. Grauert (print a letter)
The following steps show which keys to use to start a test printout.

KEY / or action	**DISPLAY**
[STATION 2] and **[COMPRESS** —**]** (synchronously)	OFF-LINE MODE MENU SETUP
[COMPRESS —**]**	OFF-LINE MODE MENU PRINTING
[COMPRESS —**]**	OFF-LINE MODE PRINTING TEST
[STOP #**]**	PRINTING TEST USER'S GUIDE
[COMPRESS —**]** up to the message Y	PRINTING TEST Dr. Grauert
[STOP #**]**	Dr. Grauert INSERT A4 SHEET
After feeding an A4 paper the printer processes the printing. If printing finished, printer will eject paper.	PRINTING TEST PRINTING; WAITING... PRINTING TEST FINISH, PRESS STAT2
[STATION 2]	PRINTING TEST Dr. Grauert
[STATION 2] and **[COMPRESS** —**]** (synchronously)	⏻ CX LQ1600K ON-LINE

```
Eilzustellung Norddeutsche
Farbwerke KG Herrn Dr.
Grauert
Große Elbstraße 64

2000 Hamburg 4


Org. III 5/37     H-A                4 34      22.04.75
17.04.75          Volkmann

Vordruckgestaltung für den allgemeinen Schrift-
verkehr, für das Bestell- und Rechnungswesen    E i l t

Sehr geehrter Herr Dr. Grauert,

Sie können das Schreiben der Briefe, Bestellungen, Rechnungen usw.
sowie das Bearbeiten des Schriftguts rationalisieren, wenn die
Vordrucke Ihres Unternehmens den folgenden Normen entsprechen:

        DIN 676 Geschäftsbrief; Vordrucke A4
        DIN 677 -; Vordruck A5
        DIN 679 Geschäftspostkarte; Vordrucke A6

        DIN 4991 Vordrucke im Lieferantenverkehr; Rechnung
        DIN 4992 -; Bestellung (Auftrag)
        DIN 4993 -; Bestellungsannahme (Auftragsbestätigung)
        DIN 4994 -; Lieferschein/Lieferanzeige
        DIN 4998 Entwurfsblätter für Vordrucke

Diese Normen enthalten alle Einzelheiten für den sinnvollen und
zweckmäßigen Aufdruck. Wenn dazu bei der Beschriftung genormter
Vordrucke DIN 5008 'Regel für Maschinenschreiben' beachtet wird,
entstehen übersichtliche und werbewirksame Schriftstücke.

Die beifgefügten 6 Mustervordrucke zeigen, daß das Beachten der
Normen die künstlerische und werbewirksame Gestaltung der Vor-
drucke nicht ausschließt.

Da wir uns auf die Herstellung genormter Vordrucke spezialisiert
haben, können wir besonders billig liefern. Eine Probestellung
wird Sie und Ihre Geschäftsfreunde von den Vorteilen überzeugen.
Mit bester Empfehlung

NORAG
Druckerei und Verlagshaus KG


Herrmann

Anlagen

6 Mustervordrucke
```

1.8 Connection to the System



1.8.1 Serial/Parallel Interface

- Switch the printer and the computer **OFF**.
- Connect the interface cable coming from the computer to the printer's standard
- RS232 C serial (1) port or to the optional Centronics Parallel (2) port.

The following values are default settings, see chapter **1.7.2 Selftest Printing Contents**.

• Interface	Dual Interface
• Baud-Rate (RS1)	9600 BPS
• Bits/Characters (RS1)	8 bit
• Parity (RS1)	None
• Stop Bits (RS1)	1
• DSR (RS1)	No

After powering the printer ON both interfaces, serial and parallel, are available for data transfer due to the shared mode. The port to which data is sent becomes active automatically.

For detail information to the ports see Chapter **7 Interface Description**.

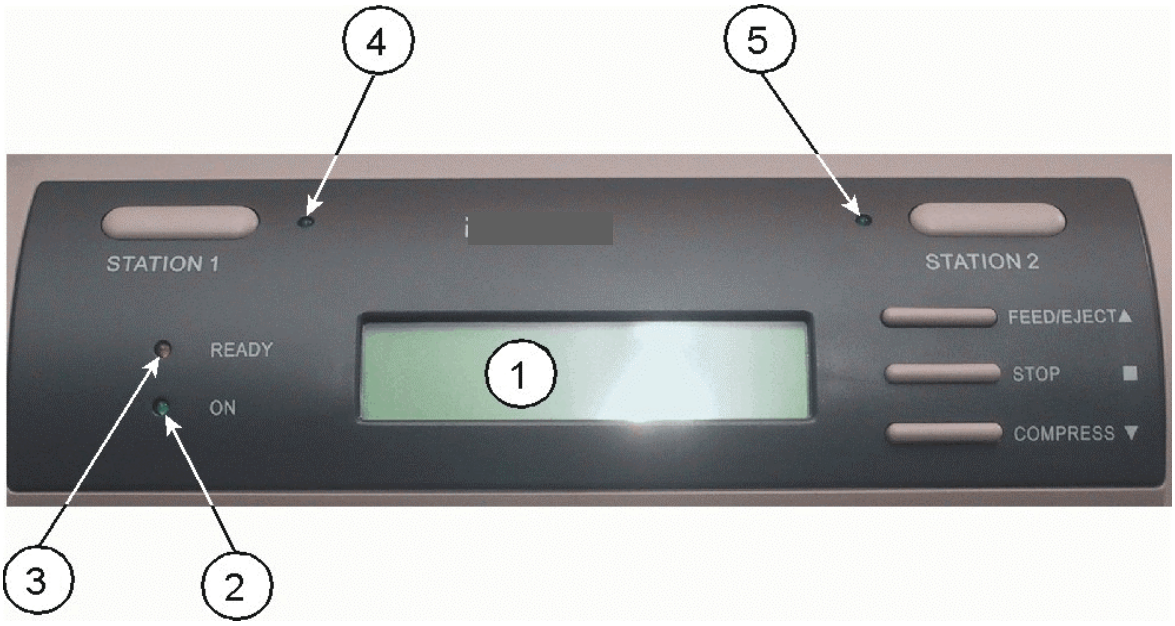
1.9 Installing the Printer Drivers

- You will find the printer drivers on the CD-ROM.

2. Printer Operation

2.1 Operator Panel

The Operator Panel
- controls the setup for communication with the host computer;
- controls various parameter settings;
- allows manual control of the paper handling;
- gives information about the printer's status.



1 Two lines **L**iquid **C**rystal **D**isplay (LCD) Display

The LCD Display (1) indicates the current status of the Printer. If any error occurs (e.g. **PLEASE CLOSE COVER**) the corresponding error message will be displayed. The green LED (2) lights only if the Printer is powered on and in the **On-line Mode**.

Light **E**mitting **D**iode (LED)

2 Online LED
3 Ready LED (flashing if receiving data)
4 Station 1 LED (user 1 active; only lighting up if a second serial Interface is installed and a special software is working)
5 Station 2 LED (user 2 active; only lighting up if a second serial Interface is installed and a special software is working)

2.2 Function Keys

The five function keys operate differently in the on line or off line mode. Please refer to the following table for details when pressing the function keys.

If the Printer is powered on, the display shows in line two **ON-LINE** and the green LED (2) lights. The Printer is in the **On-line Mode** and ready to receive and print data.

On-line Mode / Off-line Mode
In this mode only the **[STOP □]** key is active and the green LED (2) lights. By pressing the key the Printer changes into the **Off-line Mode** or back into the **On-line Mode** .

Menu-Mode
To set the Printer into the **Menu-Mode**, press the **[STATION 2]** and **[COMPRESS —]** together. Depending on the state of the Printer the four right hand keys have multiple functions. For further information see paragraph **2.5 Menu-Mode**.

Function Key	On-line	Off-line	Menu-Mode
[FEED/EJECT ▬] Menu-Mode = **UP** or **LEFT** depending on the actual menu level	• Feed or eject paper depending on the printing		• select in the Menu- Mode the previous item in the highest menu level • go up to the next item in a selected group
[STOP □] Menu-Mode = **ACCEPT**	• stop printing and change to Off-line Mode	• change to On-line Mode and continue printing	• O.k. or confirm the actual item
[COMPRESS —] Menu-Mode = **DOWN** or **RIGHT** depending on the actual menu level	• activates or cancels compression printing		• select the following item in the highest menu level • go down to the next item in a selected group

Function Key	On-line	Off-line	Menu-Mode
[STATION 2] together with **[COMPRESS —]**	• change into the Menu- Mode		• go back into the On-line Mode
[STATION 2] together with **[STOP □]**	• in “Data backup” mode of HEX PRINTING, the Printer will save the 8K data which it received lately in flash memory		
[FEED/EJECT ➨] together with **[COMPRESS —]**	• in “Data backup” mode of HEX PRINTING, the Printer will clear all received data which it backs up.		

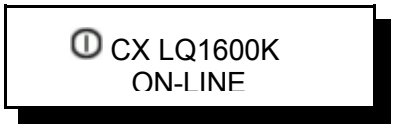
2.3 Liquid Crystal Display (LCD)

The LCD indicator gives information about the status of the printer. In general it can be distinguished between:

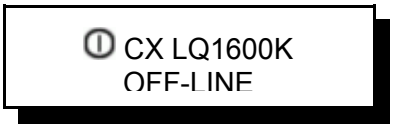
- ONLINE messages
- OFFLINE messages
- Menu Information

The LCD has two lines with 20 characters per line. After power on the display shows for example:

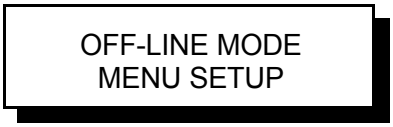
- in the upper line: the head line with the printer name, the actual interface, and the emulation
- in the second line: the status.



After pressing the **[STOP □]** key you get the **OFF-LINE** message.



After entering the **MENU MODE** by pressing the **[STATION 2]** and **[COMPRESS —]** keys together the printer displays:



You can enter the Menu Mode from the **On-line** or **Off-line Mode**.

In this state it is possible to use all four keys at the right hand side of the Operator Panel in the way as described in the table in paragraph **2.2 Function Keys**.

2.4 Load Print Medium

The Printer can deal with single sheet, cheque,multi copy carbon paper and carton. The printer will start inserting the sheet automatically when the operator puts the print medium into paper feeding path. Users needn't bother aligning the print medium with the left or right border of the printer. The printer itself aligns automatically.

Note: As soon as the auto alignment process starts after you put in a medium, please release the medium.

2.5 Menu Mode

All selectable features are accessible via the operator panel and combined in the Printer MENU.
This feature provides:

- easy configuration (language, etc.)
- quick parameter changes
- activation of test functions

There are six entry points in the highest level:

- MENU SETUP Set up the Menu parameters for various modules (common configuration and different emulation) and the important save function is included.
- MENU PRINTING Printout of the Menu which is in use.
- PRINTING TEST A printout of the user's guide, the ASCII character sets and character attributes is possible.
- ADJUSTMENT Include printing the current settings of the photoelectric sensor, re-setting up the photoelectric sensor and printing the new settings, setting up the left margin, setting up the top margin, alignment adjusting for bi-direction print, and run-in printing etc.
- DEBUG TEST A Hexdump-function is available and a soft test for reading a magnetic stripe.
- INFO INQUIRY Inquire current parameters settings of both software and hardware, including the version (version number, nonstandard issue tag, special simulation etc.), a hardware configuration (characters generators, optional interface connections, a scanner, the sprocket), PCB ID. firmware check sum etc.

2.5.1 To Confirm a Macro Selection and Save the Settings

- Press **[STOP □]** key; the confirmed value will now be shown in the head line.

```
MENU SETUP
SELECT CURRENT MACRO
```

- Press **[STOP □]** key again.

```
SELECT CURRENT MACRO
MACRO1
```

- Now it is possible to scroll up or down with the **[FEED/EJECT ➖]** or **[COMPRESS —]** key.
- Save the selected item immediately by pressing the **[STOP □]** key again.

- The display shows:

```
SELECT CURRENT MACRO
SAVING, PLEASE WAIT
```

- After the saving procedure the printer changed to the On-line Mode.

2.6 The C-650 Plus Emulations

The printer **C-650 Plus** will be delivered with two different

- **EPSON LQ1600K Emulation**
- **IBM ProPrinter X24 Emulation**

Note: Depending on the selected emulation you must also select the corresponding Printer Driver.

3. Configuring the Printer

Main Functions and Entry Points into the Menu
The following Main Functions are available:

- **Menu Setup**
  With this function you are able to modify the parameters of the printer configuration. For a detail information look at paragraph **3.4**.

- **Menu Printing**
  Printout of the Printer ID, a Needle Test and the parameter setting of the three Macros. For a detail information look at paragraph **3.2**.

- **Printing Test**
  The printing of User's Guide, ASCII character set, character attributes, Dr. Grauert (print a letter). For a detail information look at paragraph **3.5**.

- **Adjustment**
  Printing current photosensor parameters, reset photosensor parameters and printing; adjust left margin, top margin and bi-direction printing, run-in printing, inquire photosensor value, reset hardware parameters. For a detail information look at paragraph **3.6**.

- **Debug / Test**
  Hex printing (include: data backup, printing backup data, directly dump), magnetic stripe operation (include read and write). For a detail information look at paragraph **3.7**.

- **Info Inquiring**
  Inquiry the current setting parameters of software or hardware, including a version (version number, special version tag, special emulation, FPGA Version, etc.), hardware configuration (character's generators, optional interface, scanner, sprockets), printer ID. For a detail information look at paragraph **3.8**.

3.1 What is Configuration?

This chapter describes how to use the operator panel and menu settings to set up or configure your printer, so that the printer and your computer system can communicate correctly with each other.

Communication between the two requires that both, the computer operating system and the printer have the same communication settings or features. The most important of those are:

- bit/character
- baud rate
- parity
- stop bits
- DSR

You may also need to change some of the printer's other features depending on your hardware and application requirements, for example:

- special forms
- paper handling

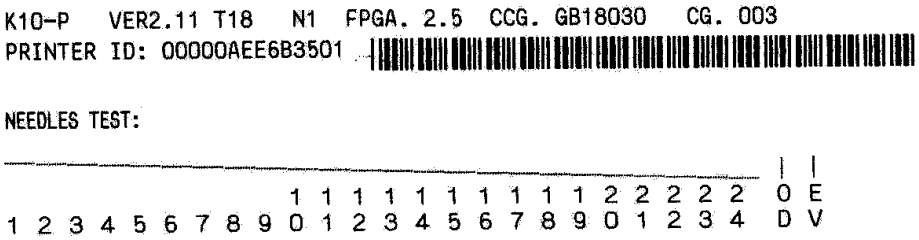
The MENU MODE allows you to access the configuration memory. All settings of the printer are stored in this memory and can be printed. The possible settings are described in detail on the following pages. A detail description of all Menu settings you will find in paragraph **3.4 Menu Setup Description**.

The standard parameter setting can be printed by using the function **PRINT MENU**. The following steps show which keys to use to start this printout.

KEY / or action	**2 Line DISPLAY**
[STATION 2] and **[COMPRESS —]** (synchronously)	OFF-LINE MODE MENU SETUP
[COMPRESS —]	OFF-LINE MODE MENU PRINTING
[STOP #]	MENU PRINTING INSERT A4 SHEET
Insert the paper	MENU PRINTING PRINTING; WAITING...
[STATION 2]	MENU PRINTING FINISH; PRESS STAT2
[STATION 2]	OFF-LINE MODE MENU PRINTING
[STATION 2] and **[COMPRESS —]** (synchronously)	C-650P SERIAL1 Epson ON-LINE

3.2 Standard Configuration

The standard configuration (factory setting) is reflected in the following printout.



CURRENT USER: MACRO1

	MACRO1*	MACRO2	MACRO3
CONFIGURE			
INTERFACE:	CX	CX	DUAL INTERFACE
RS1 EMULATION:	---	---	IBM
BAUD RATE (RS1):	---	---	9600
BIT/CHARACTER(RS1):	---	---	8
PARITY (RS1):	---	---	NONE
STOP BITS (RS1):	---	---	1
DSR (RS1):	---	---	NO
CX EMULATION:	LQ1600K	IBM	LQ1600K
CX STROBE EDGE:	RISING EDGE	RISING EDGE	RISING EDGE
DRAFT SPEED:	NORMAL	NORMAL	NORMAL
LQ TYPE:	LQ2	LQ2	LQ2
NEEDLES SWITCH:	YES	YES	YES
SPECIAL FORMS:	NO	NO	NO
BIM DIRECTION:	UNIDIRECTION	UNIDIRECTION	UNIDIRECTION
NEEDLE COMPENSATION:	NO	NO	NO
PMS #2000K:	SINGLE SHEET	SINGLE SHEET	SINGLE SHEET
PMS #2001K:	400	400	400
PMS #2002K:	NO	NO	NO
PMS #2003K:	NO	NO	NO
PMS #2004K:	205mm	205mm	205mm
PMS #2005K:	NO	NO	NO
PMS #2006K:	NO	NO	NO
PMS #2007K:	NO	NO	NO
LQ CONFIGURE			
AUTO COMRESSION:	NO		NO
LINE LENGTH COMPRESS:	NO		NO
COMPRESS PROPORTION:	108/LINE(80%)		108/LINE(80%)
FAN FOLD LEFT MARGIN:	0		0
PRINTING MODE:	LATIN		LATIN
HIGH SPEED PRINTING:	NO		NO
LPI:	6		6
CPI OF CJK FONT:	6.7		6.7
CPI OF WEST FONT:	10		10
XPI LOCKED:	NO		NO
CHARACTER SET:	PC		PC
PC CHARACTER SET:	1252 (PC-WIN LATIN1)		1252 (PC-WIN LATIN1)
CHARACTER DEFINITION:	LQ		LQ
LF+CR	YES		YES
CR+LF	NO		NO
LEFT MARG.(1/6):	0		0
LEFT MARG.(1/60):	0		0
TOP MARG.(1/6):	0		0
TOP MARG.(1/60):	0		0
ZERO SLASH:	NO		NO
LINE LENGTH:	94		94
RESET WHEN EJECT:	NO		NO

Note: An asterisk (* behind MACRO indicates the active macro.

3.2.1 Explanation of the Printout on the Previous Pages

In the headline behind the term **VER2** the revision level of the printer's firmware can be found.

Then following the Printer Identification and in the next line a needle test.

The next part of the printout is a list of the **MACRO** settings.
In this case **MACRO 1** is marked with an asterisk (*) which identifies it as the active macro.

Note: A “Macro“ is a summary of application specific parameter settings for a user. It is possible to have a total of three macros, each with a different summary of VALUE settings for different applications.

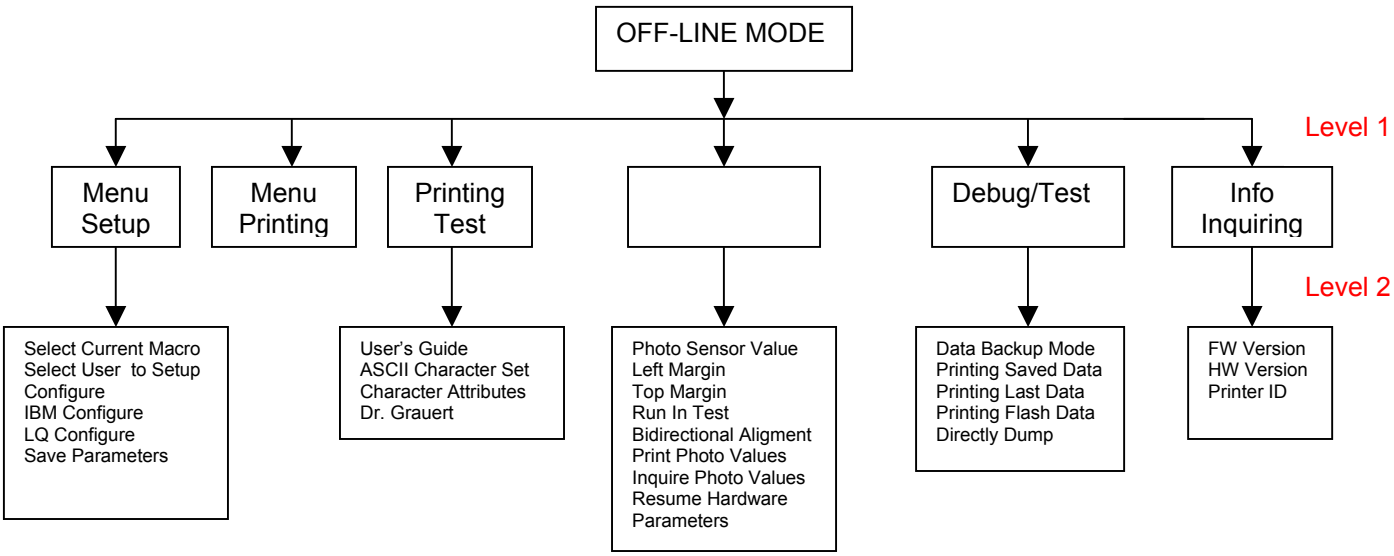
Whenever you make modifications in the active macro without saving them you will find the new settings under the heading **CURRENT USER**. Unless they are saved, the modifications will stay active only until the printer is switched off. When the printer is switched on again the macro settings marked with the asterisk will be reactivated.

Note: The **CURRENT USER** will be selected by MACRO 1, MACRO 2, or MACRO 3.

3.3 Menu Structure

Press **[STATION 2]** and **[COMPRESS** —] together to start the Menu-Mode in Off-line operation.

The Menu Mode starts with **MENU SETUP** in level 1.



3.3.1 How to use the Key in the Menu Mode

If you want to enter a menu setup, you should press down **[STATION 2]** and **[COMPRESS —]** key simultaneously in on-line mode, entering the off-line mode and then selecting **MENU SETUP** (see also Paragraph **2.2 Function Keys**).

During the Menu Mode the key's definition is as following:

- **[FEED/EJECT ➨]** upwards; it may cycle to the previous item from the first one.
- **[COMPRESS —]** downwards; it may cycle to the following item from the last one.
- **[STOP □]** accept the selected item or value
- **[STATION 2]** go back to the previous menu level or back to the top level.

The LCD display shows on the first line the current level, and on the second line the next level.

3.3.2 The Emulations of C-650 Plus

The C-650 Plus printer offers the following emulations:

- IBM
- LQ

You can modify the emulation you need by entering the corresponding menu setup.

3.4 Menu Setup Description

MENU SETUP was classified into **6** modules

- SELECT CURRENT MACRO (see paragraph **3.4**)
- SELECT USER TO SETUP (see paragraph **3.4**)
- CONFIGURE (see paragraph **3.4.3**)
- IBM CONFIGURE (see paragraph **3.4.4**)
- LQ CONFIGURE (see paragraph **3.4.5**)
- SAVE PARAMETERS (see paragraph **3.4.6**)

To modify various modules' parameters you should enter a corresponding module. Before modifying printer parameters, please select the desired macro first. The current macro is the one to be changed.

3.4.1 SELECT CURRENT MACRO

The printer stores up to three user settings in MACRO 1 up to MACRO 3.
Use the **[STOP #]** key to activate this function. The active macro is displayed first. Press the **[COMPRESS —]** key until you find the macro for your application and selected it with the **[STOP #]** key. The printer will save the selected macro immediately. After the procedure the printer changes into the ON-LINE mode and will now work with the new settings.

3.4.2 SELECT USER TO SETUP

With the module **SELECT USER TO SET UP** you have the choice between MACRO 1, MACRO 2, and MACRO 3. Select the macro witch should be changed.

Note: If you have selected all new items and have these confirmed with the **[STOP]** key, don't forget to activate the module **SAVE PARAMETERS**.

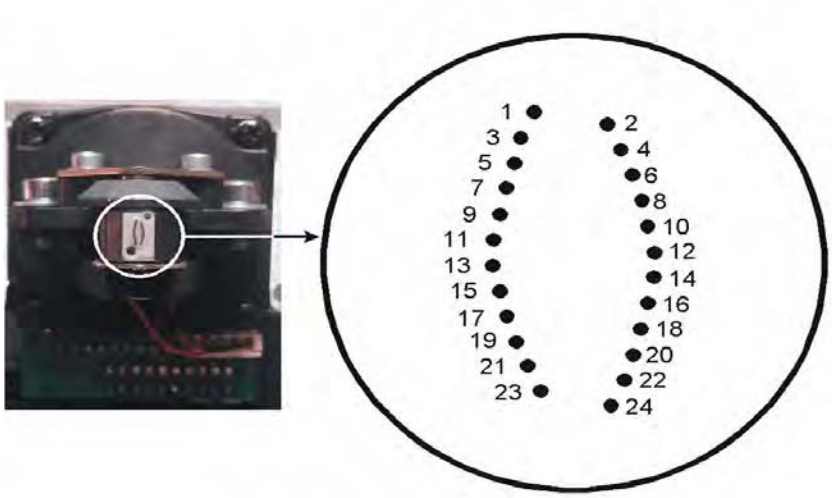
3.4.3 CONFIGURE

The following items can be modified according to the **C-650 Plus**

Note: In the different emulations the items shown are not equal. The option's which are printed in **bold** indicate the actual setting.

CONFIGURE			
Parameter	**Option**	**Explanation**	**Note**
RESUME DEFAULT VALUE	**NO** YES	Select resume default value or not, If select **YES**, jump to **SAVE PARAMETERS** the parameters will be resumed the default value if pressing **[STOP]** to confirm.	This option is mainly used to resume the default value when the menu parameters have been changed in disorder.
INTERFACE	**DUAL INTERFACE** SERIAL1 CX	Select the interface you want to use.	**DUAL** or **CX** will be selected only if an optional interface card is installed.
RS1 EMULATION	IBM LQ1600K	Select your RS1 emulation	

CONFIGURE			
Parameter	**Option**	**Explanation**	**Note**
MODIFY RS1 CONFIG	**NO** YES	If **YES** configure also baud rate, bits/character, parity and stop bit. **NO** not used with **CX EMULATION** .	
BAUD RATE (RS1)	2400 4800 **9600** 19200	Controls the speed of the data transfer. The baud rate for the printer should be corresponding to the settings of the computer.	Only displayed if **MODIFY RS1 CONFIG** is set to **YES**
BITS/CHARACTER (RS1)	**87**	Number of bits that represent a character.	Only displayed if **MODIFY RS1 CONFIG** is set to **YES**
PARITY (RS1)	**NONE** EVEN ODD	The data transfer will be checked by an even or odd parity bit.	Only displayed if **MODIFY RS1 CONFIG** is set to **YES**
STOP BITS (RS1)	**12**	Number of stop bits which are in use.	Only displayed if **MODIFY RS1 CONFIG** is set to **YES**
DSR (RS1)	**NO** YES	SERIAL 1 handle the DSR signal or not.	Only displayed if **MODIFY RS1 CONFIG** is set to **YES**
CX EMULATION	**IBM** LQ 1600K	The emulation determines the set of commands available for the printer:	
CX STROBE EDGE	**RISING EDGE** FALLING EDGE	Select the trig mode of the printer strobe signal (CX present.	
DRAFT SPEED	**NORMAL** HIGH SPEED	Select printer speed in draft mode.	
LQ TYPE **NLQ1**	 NLQ2	Select the printer type in LQ mode.	
NEEDLES SWITCH	**YES** NO	YES = activated No = ignored	

CONFIGURE			
Parameter	**Option**	**Explanation**	**Note**
SPECIAL FORMS	**NO** YES	**YES** reduce the speed of paper handling, and add some special management to support special forms, e.g. thin paper, paper with different thickness.	
BIM DIRECTION UNIDIRECTION		Select printing direction for graphics.	
NEEDLE COMPENSATION	**NO** YES	Select needle compensation or not when the needle is broken.	
Needle Position 			
HS COMPENSATION	NO YES	Select heigh speed compensation or not	Only displayed if **NEEDLE COMPENSATION** is set to **YES**
BROKEN NEEDLE NO.	1 up to 24	Choose the one needle from needle 1 up to needle 24 for compensation.	Only displayed if **NEEDLE COMPENSATION** is set to **YES**
PNS SELECTION YES		Whether the following PNS items are valid or not.	
PNS #2000K	**SINGLE SHEET** 205 mm 220 mm	The selection will influence the ejection of the paper. Single Sheet means A4	Only displayed if **PNS SELECTION** is set to **YES**

CONFIGURE			
Parameter	**Option**	**Explanation**	**Note**
PNS #2001K	**400** selectable: 200 up to 1000 in steps of 100	Digital filter (CX STB)	Only displayed if **PNS SELECTION** is set to **YES**
PNS #2002K	**NO** Yes	reserved	Only displayed if **PNS SELECTION** is set to **YES**
PNS #2003K	**NO** Yes	reserved	Only displayed if **PNS SELECTION** is set to **YES**
PNS #2004K	**205 mm** YES NO 145 mm	Printhead moves out of paper with vertical movement or not . **NO,** the print head never moves out of paper edge. **145 mm** / **205 mm**, the print head moves out of the paper if the paper width is less than 145 or 205 mm. **YES** the print head always moves out of the paper.	Only displayed if **PNS SELECTION** is set to **YES**
PNS #2005K	**ERROR** SPACE CHAR1 CHAR2 IGNORE		Only displayed if **PNS SELECTION** is set to **YES**

.

3.4.4 IBM CONFIGURE

The following items can be modified according to the IBM parameters.

Note: In the different emulations the items shown are not equal. The option's which are printed in **bold** indicate the actual setting.

IBM CONFIGURE			
Parameter	**Option**	**Explanation**	**Note**
EMULATION	**IBM X24** IBM PPII	Select your printer emulation	
AGM	NO **YES**	**NO** = ignore AGM graphic printing **YES** = AGM graphic printing is active	AGM is only for IBM X24 printers valid.
HIGH SPEED PRINTING	**YES** NO A4 SHEET FANFOLD PAPER	Selecting high speed printing mode. **NO** = no draft mode. **A4 SHEET** = always draft mode when the paper is A4 Sheet. **FANFOLD PAPER** = always draft mode when the paper is fanfold paper. **YES: =** the print mode always is draft.	
CPI	10 **12** 15 17.1 20	Defines the number of characters printed per inch.	
LPI	**5** **6**	Defines the number of lines printed per inch.	
CHARACTER DEFINITION	**DRAFT** LQ	Selecting the printing quality.	
LF+CR	NO **YES**	**YES**: LF = LF + CR **NO**: LF = LF	
CR+LF	**NO** YES	**NO**: CR = CR **YES**: CR = CR + LF	
LEFT MARG. (1/60")	**0** -6 up to +6	To adjust the left margin more to left or right in units of 1/60" inch (about 4 mm).	
TOP MARG. (1/60")	**0** -6 up to +6	Adjust the top margin in units of 1/60 inch (about 4 mm).	TOF = **T**op **O**f **F**orm

IBM CONFIGURE			
Parameter	**Option**	**Explanation**	**Note**
IBM CHARACTER SET	**PC** ISO	Select **PC** character set or **ISO** character set.	**PC** continued with PC CHARACTER SET; **ISO** continued with ISO CHARACTER SET.
PC CHARACTER SET	**437(INT)** 210(GR) 220(E) 850(LATIN 1) 851(GREEK) 852(LATIN 2) 855(CYRILLIC) 857(LATIN 5) 858(LATIN EURO) 860(P) 862(IL) 863(CAN. FR.) 864(ARABIC) 865(NORDIC) 866(CYRILLIC) DK/N DK 1252(PC-WIN LATIN1) 1250(PC-WIN LATIN2) CHINA CHN2 990(PC-866-BG 991(PC-GER)	Select the code page of the **PC** character set.	Only displayed if **IBM CHARACTER SET** is set to **PC**.
ISO CHARACTER SET	**CPOLUNIX** 8859/15 8859/1 8859/2 8859/5 8859/6 8859/7 8859/8 8859/9	Select the code page of the **ISO** character set.	Only displayed if **IBM CHARACTER SET** is set to **ISO**.
PC TABLE	TABLE 1 **TABLE**	Select the PC Table 1 or Table 2	
BOF IBM-PP LIKE	NO **YES**	Setting the bottom margin **NO** = 2.3 mm **YES** = 10 mm	BOF = **B**ottom **O**f **F**orm
TOP IBM PP LIKE	NO **YES**	Setting the top margin. **NO** the physical top margin (adjustable) **YES** = 7.4 mm	TOF = **T**op **O**f **F**orm

IBM CONFIGURE			
Parameter	**Option**	**Explanation**	**Note**
ZERO SLASH	**NO** YES	Select the printout of 0 (0x30 = zero) **YES** = the 0 will be printed with a slash on it (e.g. Ø).	
LINE LENGTH	80 90	Setting the line length in unit of character of 10 CPI.	
INSERT MODE	**DIRECT** PR2 LIKE	Selecting the paper insert mode. **DIRECT** = PR9 insert paper directly when paper alignment. **PR2 LIKE** = PR9 insert paper when printing data is received, it is same procedure as PR2.	
PAGE LENGTH	11 **12**	Setting the page length in the units of an inch.	
RESET WHEN EJECT	**NO** YES	**NO** = no reset **YES** = the printer will be reset when eject a form.	
COMPRESS	16.6 **17.1**	Setting CPI which command **SI** set. **16.6** = 16.6 CPI **17.1** = 17.1 CPI	
PNS SELECTION	**NO** YES	Whether the following PNS item is valid or not.	
PNS #2080K	**NO** YES	**NO** = Double height printing and bold printing are permissible in any print pitch.	Only displayed if **PNS SELECTION** is set to **YES**. Relative to the PNS4001K of PR2E.

3.4.5 LQ CONFIGURE

The following items can be modified according to the LQ parameters.

Note: In the different emulations the items shown are not equal. The option's which are printed in **bold** indicate the actual setting.

LQ CONFIGURE			
Parameter	**Option**	**Explanation**	**Note**
AUTO COMPRESSION	**NO** YES	Determine whether automatically condense current line for printing, when current line length exceeds the allowed line length.	
LINE LENGTH COMPRESS	**NO** YES	Determine whether the line width to compress or is fixed by the menu setting.	
COMPRESS PROPORTION	101/LINE (85%) **108/ LINE (80%)** 115/ LINE (75%) 123/ LINE (70%) 133/ LINE (65%) 144/ LINE (60%) 157/ LINE (55%) 170/ LINE (50%)	Select the proportion of the automatic line condensation.	
FANFOLD LEFT MARG.	**0** 0 up to +7	Select the left margin for the 80 columns fan fold paper in steps of 1/10 inch.	
PAPER EMPTY WARNING	**NO** YES	**NO** = blocking of the parallel port, when there is no paper in **the C-650 PLUS**. **YES** = no blocking	
HIGH SPEED PRINTING	**YES** NO A4 SHEET FANFOLD PAPER	Selecting high speed printing mode. **NO** = no draft mode. **A4 SHEET** = always draft mode when the paper is A4 Sheet. **FANFOLD PAPER** = always draft mode when the paper is fan fold paper. **YES: =** the print mode always is draft.	
LPI	**5** **6**	Defines the number of lines printed per inch.	

LQ CONFIGURE			
Parameter	**Option**	**Explanation**	**Note**
CPI OF WEST FONT	10 12 15 17 20	Select CPI of ASCII character.	
CHARACTER SET	**PC** ISO	Select **PC** character set or **ISO** character set.	**PC** continued with PC CHARACTER SET; **ISO** continued with ISO CHARACTER SET.
PC CHARACTER SET	**437(INT)** 210(GR) 220(E) 850(LATIN 1) 851(GREEK) 852(LATIN 2) 855(CYRILLIC) 857(LATIN 5) 858(LATIN EURO) 860(P) 862(IL) 863(CAN. FR.) DK/N DK 1252(PC-WIN LATIN1) 1250(PC-WIN LATIN2) CHINA CHN2 990(PC-866-BG 991(PC-GER)	Select the code page of the **PC** character set.	Only displayed if **IBM CHARACTER SET** is set to **PC**.
ISO CHARACTER SET	**CPOLUNIX** 8859/15 8859/1 8859/2 8859/5 8859/6 8859/7 8859/8 8859/9	Select the code page of the **ISO** character set.	Only displayed if **IBM CHARACTER SET** is set to **ISO**.
CHARACTER DEFINITION	**DRAFT** LQ	Selecting the printing quality.	
LF+CR	NO **YES**	**YES**: LF = LF + CR **NO**: LF = LF	

LQ CONFIGURE			
Parameter	**Option**	**Explanation**	**Note**
CR+LF	**NO** YES	**YES**: CR = LF + CR **NO**: CR = CR	
LEFT MARG. (1/60")	**0** -6 up to +6	To adjust the left margin more to left or right in units of 1/60" inch (about 4 mm).	
TOP MARG. (1/6")	**0** -1 up to +6	Adjust the top margin in units of 1/6 inch.	TOF = **T**op **O**f **F**orm
TOP MARG. (1/60")	**0** -5 up to +5	Adjust the top margin in units of 1/60 inch (about 4 mm).	TOF = **T**op **O**f **F**orm
ZERO SLASH	**NO** YES	Select the printout of 0 (0x30 = zero) **YES** = the 0 will be printed with a slash on it (e.g. Ø).	
LINE LENGTH	80 90 **94**	Setting the line length in unit of character of 10 CPI.	
RESET WHEN EJECT	**NO** YES	**NO** = no reset **YES** = the printer will be reset when eject a form.	
PNS SELECTION	**NO** YES	Whether the following PNS item is valid or not.	
PNS #2100K	**NO** YES	**YES** = Reset automatically line condensation when Form Feed command executed. **NO** = no reset	Only displayed if **PNS SELECTION** is set to **YES**.
PNS #2101K	**NO** YES	**NO** = ignore 0x20 at the end of a line. **YES** = don't ignores 0x20 at the end of a line.	Only displayed if **PNS SELECTION** is set to **YES**.
PNS #2102K	**NO** YES	**YES** = Process of the horizontal and vertical movement command: ESC $; ESC \; ESC (v) **NO** = ignore the command	Only displayed if **PNS SELECTION** is set to **YES**. This PNS is only active on ver. 1.08 or higher.

3.4.6 SAVE PARAMETERS

Any desired changes to the default settings can be saved here. After power on the new settings are activated.

While this function is operating the display shows the message

- **SAVING, PLEASE WAIT** and then
- **SAVED, RESTART C-650 Plus.**

Now the printer changed into the **ON -LINE** mode.

3.5 PRINTING TEST

There are five test printouts available:
- User's Guide
- Ascii Character Set
- Character Attributes
- Dr. Grauert (print a letter)

3.5.1 USER'S GUIDE
In the User's Guide you will find detail information. So it is possible to print out the User's Guide by yourself. If this function is selected the printer asks for A4 sheets. After inserting an A4 sheet the printer starts the print-out.

With the **[STATION 2]** key it is possible to skip the selection.

3.5.2 ASCII CHARACTER SET
The stored ASCII character sets are:
- GB
- ROMAN
- INT 437
- CANADIAN FRENCH
- OCR A
- OCR B

3.5.3 CHARACTER ATTRIBUTES
All included character attributes are printed here.

3.5.4 Dr. GRAUERT
This test printout produces a standard letter (ECMA-132) which can be used for measuring the printer's throughput.

3.6 ADJUSTMENT

Adjustment can be used to adjust and check some built-in parameters of the printer. It may enhance the print performance. Sometimes, it's possible to improve the rationality of the page layout according to the practical environment. The printer has been adjusted corresponding to factory standard before it is delivered.

Warning: **The user who wants to adjust these parameters of the printer should be a professional engineer or be guided by a professional engineer.**

User usually should not change the settings. If the printer has to be adapted, the user should have already well understood the involved parameters. Or else the printer may miss normal function. The following introduce the adjustable parameters.

These parameters below allow manipulation on operator panel:

- Photosensor Value (see paragraph **3.6.1**)
- Left Margin (see paragraph **3.6.2**)
- Top Margin (see paragraph **3.6.3**)
- Run In Test (see paragraph **3.6.4**)
- Alignment Adjustment for Bidirectional Printing (see paragraph **3.6.5**)
- Printing Photosensor Value (see paragraph **3.6.6**)
- Inquire Photosensor Values (see paragraph **3.6.7**)
- Resume HW Parameters (see paragraph **3.6.8**)

3.6.1 PHOTOSENSOR VALUE

All the photo sensor value has been adjusted to correct values in the factory, but after using it for many days, some unexpected change may happen for some reason, such as using unacceptable paper. In order to make the printer work correctly, please adjust the photo sensor value again.

After entering adjustment, you have to do the following steps:

Key or action	**Two line display**
Select Adjustment	ADJUSTMENT PHOTOSENSOR VALUE
[STOP #] There is a noise of the rollers and the green lamp of Station 2 light up	PHOTOSENSOR VALUE INSERT SHEET; PRESS #
insert paper and press **[STOP #]**	PHOTOSENSOR VALUE INSERT SHEET; PRESS #
The printer insert the paper and start the setup of the photo sensor. Paper eject after adjustment.	PHOTOSENSOR VALUE END. PRESS # TO PRINT
[STOP #]	PHOTOSENSOR VALUE INSERT A4 SHEET
Insert paper; after print the values the paper will be eject	PHOTOSENSOR VALUE FINISH; PRESS STAT 2
[STATION 2]	PHOTOSENSOR VALUE

Key or action	**Two line display**
[STATION 2] ***Note:*** The adjustment is only active during power on.	OFF-LINE MODE ADJUSTMENT
[STATION 2] and **[COMPRESS** —**]** together to leave the off-line mode	SAVE PARAMETERS # ACCEPT ST2 = IGNORE

The new values of adjustment to be default settings can be saved now or ignore the new values. After saving and power OFF and ON the new adjustment is still activated.

3.6.2 LEFT MARGIN

The **[FEED/EJECT ➨]** key reduce the current value (left margin is moving to the left side) and the **[COMPRESS** —**]** key increases the current value (moving to the right side).

After entering adjustment, you have to do the following steps:

Key or action	**Two line display**
Select Adjustment	ADJUSTMENT PHOTOSENSOR VALUE
[COMPRESS —**]** until LCD shows	ADJUSTMENT LEFT MARGIN
[STOP #**]** to select	LEFT MARGIN 17 ➨ = LEFT — = RIGHT
Press **[FEED/EJECT ➨]** or **[COMPRESS** —**]** to find the new left margin. The range is from zero up to 133.	LEFT MARGIN 20 ➨ = LEFT — = RIGHT
Insert an A4 sheet to control the setting. The printer will insert the paper automatically, print the current margin and eject the paper.	LEFT MARGIN (20) ➨ = LEFT — = RIGHT
[STOP #**]** to accept	LEFT MARGIN SAVE PARAMETERS
Display after saving	ADJUSTMENT LEFT MARGIN

3.6.3 TOP MARGIN

The **[FEED/EJECT ▬]** key reduce the current value (top margin is moving upwards) and the **[COMPRESS —]** key enlarge the current value (moving downwards).

After entering adjustment, you have to do the following steps:

Key or action	**Two line display**
Select Adjustment	ADJUSTMENT PHOTOSENSOR VALUE
[COMPRESS —] until LCD shows	ADJUSTMENT TOP MARGIN
[STOP #] to select	TOP MARGIN 030 ▬ = UP — = DOWN
Press **[FEED/EJECT ▬]** or **[COMPRESS —]** to find the new top margin. The range is from zero up to 214.	TOP MARGIN 042 ▬ = UP — = DOWN
Insert an A4 sheet to control the setting. The printer will insert the paper automatically, print the current margin and eject the paper.	TOP MARGIN (042) ▬ = UP — = DOWN
[STOP #] to accept	TOP MARGIN SAVE PARAMETERS
Display after saving	ADJUSTMENT TOP MARGIN

3.6.4 RUN IN TEST

After selecting the Run in Test the printer will insert a sheet and start nonstop printing.

Key or action	**Two line display**
Select Adjustment	ADJUSTMENT PHOTOSENSOR VALUE
[COMPRESS —] until LCD shows	ADJUSTMENT RUN IN TEST
[STOP #] to select The yellow Ready lamp lights up.	RUN IN TEST PLEASE INSERT SHEET
The printer starts printing horizontal lines after inserting a paper.	RUN IN TEST NO: 00 printing, finish: 00
Now it is possible to stop printing by pressing the **[STOP #]** key.	RUN IN TEST NO: 00 printing, finish: 00
[STOP #] continued printing	RUN IN TEST NO: 00 printing, finish: 00
Power off the printer to leave the continued printing.	

Note: Use Bidirectional Alignment Adjust to correct an offset in the vertical lines (see paragraph **3.6.5**).

3.6.5 BIDIRECTIONAL ALIGNMENT ADJUSTMENT

After selecting the Bidirectional Alignment it is possible to align the printing of vertical lines.

Key or action	**Two line display**
Select Adjustment	ADJUSTMENT PHOTOSENSOR VALUE
[COMPRESS —] until the LCD shows:	ADJUSTMENT BIDIRECTION ALIGN
[STOP #] to select The yellow Ready and green Station 2 lamp lights up.	BIDIRECTION ALIGN RESULT OF ALL SPEED
Press the **[STOP #]** key BIDIRECTION ALIGN	BIDIRECTION ALIGN INSERT A4 SHEET
The printer starts printing vertical lines after inserting a paper.	BIDIRECTION ALIGN FINISH; PRESS STAT2
[STATION 2]	BIDIRECTION ALIGN RESULT OF ALL SPEED
Now press **[FEED/EJECT ➨]** or **[COMPRESS —]** until you can select the font and CPI which you want to align (e.g. DRAFT 12 CPI).	BIDIRECTION ALIGN DRAFT 12CPI
Press the **[STOP #]** key to accept the selection.	BIDIRECTION ALIGN 000 ➨ = LEFT — = RIGHT
Use the **[FEED/EJECT ➨]** or **[COMPRESS —]** key for alignment (e.g. left 5 times). If you are going to the right the numeric value will be indicated by an minus sign (e.g. -005).	BIDIRECTION ALIGN 005 ➨ = LEFT — = RIGHT
Insert an A4 sheet and the printer starts a control print of your selection.	BIDIRECTION ALIGN 005 ➨ = LEFT — = RIGHT
Press the **[STOP #]** key to accept and save your selection**.**	DRAFT 12CPI SAVE PARAMETERS
Now you can select an other font for alignment or leave the function.	BIDIRECTION ALIGN DRAFT 12CPI
If you want to leave the off-line mode press **[STATION 2]** and **[COMPRESS —]** together.	SAVE PARAMETERS # ACCEPT ST2 = IGNORE
Because the parameters are saved, press **[STATION 2]** to ignore.	⏻ CX LQ1600K ON-LINE

*) The displayed line is depending on the selected emulation.

3.6.6 PRINT PHOTO VALUES

With the selecting of Print Photo Values you can start a print out photo sensor values.

Key or action	**Two line display**
Select Adjustment	ADJUSTMENT PHOTOSENSOR VALUE
[COMPRESS —] until the LCD shows:	ADJUSTMENT PRINT PHOTO VALUES
[STOP #] to select The yellow Ready and green Station 1 lamp lights up.	PRINT PHOTO VALUES INSERT A4 SHEET
The printer starts printing the values after inserting a paper.	PRINT PHOTO VALUES FINISH, PRESS STAT2
[STATION 2]	ADJUSTMENT PRINT PHOTO VALUES
If you want to leave the off-line mode press **[STATION 2]** and **[COMPRESS —]** together.	SAVE PARAMETERS # ACCEPT ST2 = IGNORE
Press **[STATION 2]** to ignore.	⏻ CX LQ1600K ON-LINE

*) The displayed line is depending on the selected emulation.

Sample of the Print Photo Values:

Sensor	Ref. Level	Current	Valid
Paper Pres. 1	0341	0040	Y
Paper Pres. 2	0341	0040	Y
Paper Allin. 1	0372	0048	Y
Paper Allin. 2	0348	0040	Y
Paper Allin. 3	0351	0040	Y
Paper Allin. 4	0341	0040	Y
Paper Edge	0347	0120	Y

3.6.7 INQUIRE PHOTO VALUES

The inquiry of the photosensor can be classified into

- Photo Value-set and
- Photo Value-actual.

For both selections you can inquire 7 class photosensor values

- Paper Intro1
- Paper Intro2
- Paper Alline 1
- Paper Alline 2
- Paper Alline 3
- Paper Alline 4
- Paper Edge

You can check each photosensor value by pressing **[COMPRESS —]** (means move downwards) or **[FEED/EJECT ➨]** (means upwards).

Key or action	**Two line display**
Select Adjustment	ADJUSTMENT PHOTOSENSOR VALUE
[COMPRESS —] or **[FEED/EJECT ➨]** until the LCD shows:	ADJUSTMENT INQUIRE PHOTO VALUES
[STOP #] to select	INQUIRE PHOTO VALUES PHOTO VALUE SET
For inquire press **[STOP #]** continue with **[COMPRESS —]** or **[FEED/EJECT ➨]** to check various values	INTRO CUR VOL. 0260
Press **[STATION 2]** to exit	INQUIRE PHOTO VALUES PHOTO VALUE SET

Now you can select other operations you want.

3.6.8 RESUME HARDWARE PARAMETERS

All standard default settings of the firmware will be restored. The contents of the page counter will not be changed, but all other settings are reset.

Key or action	**Two line display**
Select Adjustment	ADJUSTMENT PHOTOSENSOR VALUE
[COMPRESS —] until the LCD shows:	ADJUSTMENT RESUME HW PARAMETERS
[STOP #] to select The yellow Ready and green Station 1 and Station 2 lamp lights up.	RESUME HW PARAMETERS # ACCEPT ST2 = IGNORE
Press**[STOP #]** to accept	ADJUSTMENT RESUME HW PARAMETERS
or **[STATION 2]** to ignore.	OFF-LINE MODE ADJUSTMENT
If you want to leave the off-line mode press **[STATION 2]** and **[COMPRESS —]** together.	SAVE PARAMETERS # ACCEPT ST2 = IGNORE
Press **[STATION 2]** to ignore.	CX LQ1600K ON-LINE

*) The displayed line is depending on the selected emulation.

3.7 DEBUG / TEST

The Debug / Test parameter defines the execution of control sequences when Hex-printing has been activated. The incoming or stored data from the host are printed in hex mode. This is an excellent help for the programmer.

The Debug/ Test mode is arrange into two groups:
- Hex Printing
- Magnetic Test

In the Hex Printing mode we will find five groups:
- Data Backup Mode
- Printing Saved Data
- Printing Last Data
- Printing Flash Data
- Directly Dump

The HEX print is divided into three groups:
- 1. the transmission code first with five bytes
- 2. values of the data in HEX
- 3. ASCII code of the printed data

	1.	2.	3.
Sample:	00000	00 0C 07 0D 07 0D 07 0D 07 0D 07 0D	0 & C * C * C * C * C *

3.7.1 DATA BACKUP MODE

The Data Backup Mode is using the buffer of the printer. All receiving data from the host are saved first. To get data printed select after saving the data the function Printing Saved Data (see paragraph **3.7.2**).

Note: The new to be saved data will overwrite the saved data before.

Key or action	**Two line display**
Select Debug / Test	DEBUG/TEST HEX PRINTING
[COMPRESS —]	HEX PRINTING DATA BACK UP MODE
[STOP #] to select You hear a short beep.	HEX PRINTING WAITING FOR DATA ...
The receiving data from the host will be stored in the buffer of the printer.	HEX PRINTING OPERATE NATURALLY
[STOP #] to stop hex printing	HEX PRINTING OPERATE NATURALLY
If you want to leave the off-line mode press **[STATION 2]** and **[COMPRESS —]** together.	SAVE PARAMETERS # ACCEPT ST2 = IGNORE
Press **[STATION 2]** to ignore.	⏻ CX LQ1600K ON-LINE

*) The displayed line is depending on the selected emulation.

3.7.2 PRINTING SAVED DATA

All before in the buffer of the printer saved data can be printed in HEX format with this function.

Note: The saved data are printed **with two bytes first** (in the sample in bold), which indicates the length of the saved data.

Sample: 00000 **00 0C** 07 0D 07 0D 07 0D 07 0D 07 0D **0** & C * C * C * C * C *

Key or action	**Two line display**
Select Debug / Test	DEBUG/TEST HEX PRINTING
[COMPRESS —] until the LCD shows:	HEX PRINTING PRINTING SAVED DATA
[STOP #] to accept The green Station 2 lamp is flashing.	HEX PRINTING INSERT A4 SHEET
The printer starts printing vertical lines after inserting a paper.	HEX PRINTING PRINTING, WAITING...
After printing and eject the page the LCD shows:	HEX PRINTING POWER OFF OR OTHERS

3.7.3 PRINTING LAST DATA

All last used and in the buffer of the printer saved data can be printed in HEX format with this function.

Key or action	**Two line display**
Select Debug / Test	DEBUG/TEST HEX PRINTING
[COMPRESS —] until the LCD shows:	HEX PRINTING PRINTING LAST DATA
[STOP #] to accept The green Station 2 lamp is flashing.	HEX PRINTING INSERT A4 SHEET
The printer starts printing vertical lines after inserting a paper.	HEX PRINTING PRINTING, WAITING...
After printing and eject the page the LCD shows:	HEX PRINTING POWER OFF OR OTHERS

3.7.4 PRINTING FLASH DATA

All in the flash saved data can be printed in HEX format with this function.

Key or action	**Two line display**
Select Debug / Test	DEBUG/TEST HEX PRINTING
[COMPRESS —] until the LCD shows:	HEX PRINTING PRINTING FLASH DATA
[STOP #] to accept The green Station 2 lamp is flashing.	HEX PRINTING INSERT A4 SHEET
The printer starts printing vertical lines after inserting a paper.	HEX PRINTING PRINTING, WAITING...
After printing and eject the page the LCD shows:	HEX PRINTING POWER OFF OR OTHERS

3.7.5 DIRECTLY DUMP

The receiving data from the host will not stored first in the buffer of the printer. They will be printed directly after being received by the printer.

Note: The directly printed data are printed **without the two bytes first**. So there is no indication of the length of the printed data.

Sample: 00000 07 0D 07 0D 07 0D 07 0D 07 0D 07 0D C * C * C * C * C * C *

Key or action	**Two line display**
Select Debug / Test	DEBUG/TEST HEX PRINTING
[COMPRESS —] until the LCD shows:	HEX PRINTING DIRECTLY DUMP
[STOP #] to accept The green Station 2 lamp is flashing.	HEX PRINTING INSERT A4 SHEET
The printer starts printing vertical lines after inserting a paper.	HEX PRINTING PRINTING, WAITING...
After printing and eject the page the LCD shows:	HEX PRINTING POWER OFF OR OTHERS

Note: During the Directly Dump process, if the printer ejects paper automatically, it indicate that the printing has been finished, but if the printer does not eject paper automatically, press **[FEED/EJECT ➨]** key to eject the paper.

Caution: The performance in the two different modes is different. In the Data Backup Mode, the printer doesn't only print HEX, but also execute the programmer correctly (the bell will sound six times). But in the Directly Dump, the printer just prints in HEX.

3.8 INFO INQUIRING

You get information of the current setting parameters of software or hardware. This information is important for the system engineer and service staff.

You can select the following parameters:
- FW VERSION
- HW CONFIGURATION
- PRINTER ID

3.8.1 FW Version

The parameter firmware version shows:
- version number
- special version tag

e.g.:

```
FW VERSION
VER2.09   T7FPGA:2.4
```

Note: In this sample indicates **VER2.09** the version number (firmware release), and **T7** the special version tag.

3.8.2 HW Configuration

The parameter hardware configuration gives information over:
- characters generators
- optional interface
- scanner (only with MagneticTest)

e.g.:

```
HW CONFIGURATION
GB18030 CX
```

3.8.3 Printer ID

The display shows the identification of the printer:

e.g.:

```
PRINTER ID
00000AEE6B3501
```

4. Maintenance

Preferred Material
The following materials and cleaning lubricants are recommended when maintaining the printer:

- Lint-free soft cloth
- Light vacuum cleaner.

4.1 Cleaning Surrounding Areas

The user should clean the printer every six months. If you experience paper feed problems or if the print head carriage movement is hampered, cleaning should be carried out more often.

Maintenance work of **C-650 Plus** printer is very simple, all you need to do is:

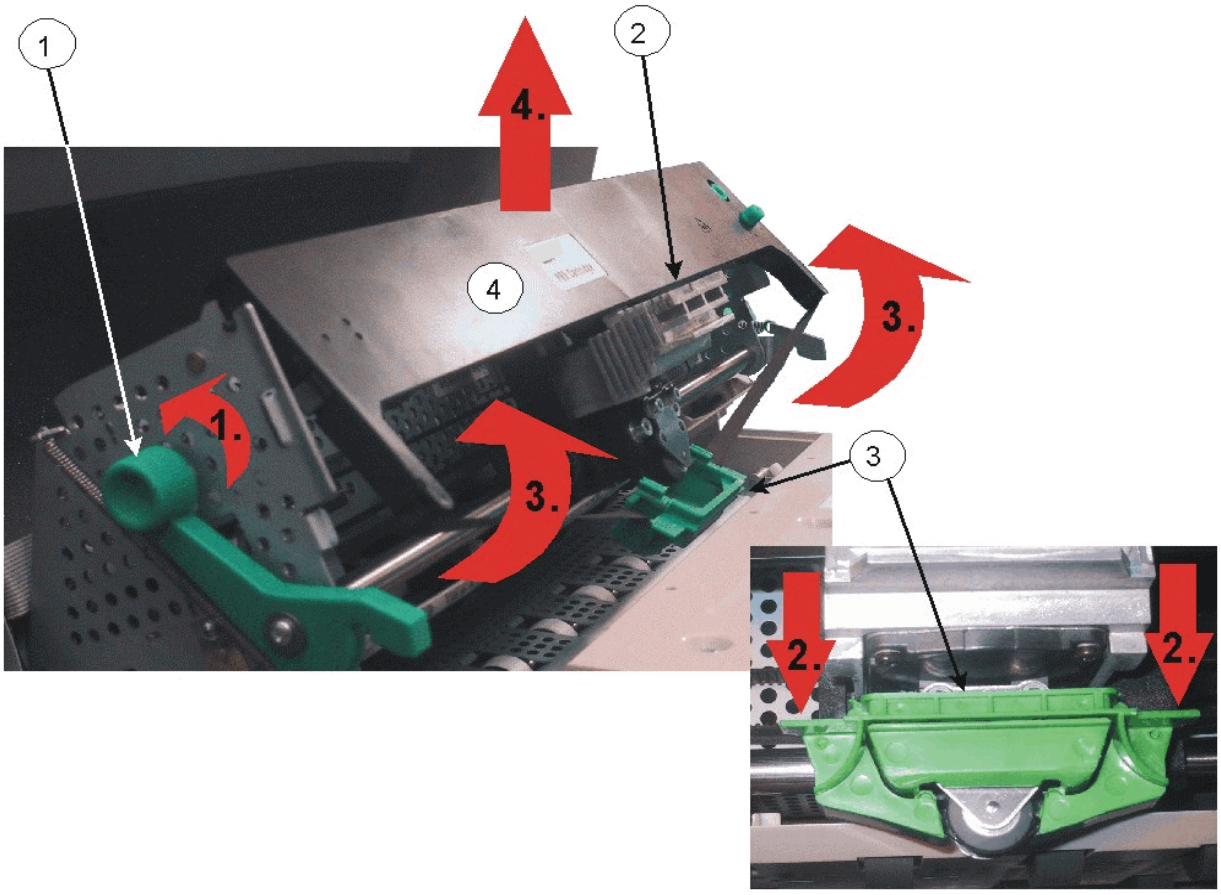
- remove the ribbon and
- remove the Alignment

Note: Before doing the cleaning, please switch off the printer and unplug the power cord first.
Don't use alcohol, liquor or brushes with hard hair to clean the printer. Be careful not to let water and other liquid flow into the inner of printer.

4.1.1 Remove the Ribbon

- Power the printer on.
- Open the top cover; the print head (2) is moving to the centre.
- Step 1: swivel the green print unit lift handle (1) backwards to lift the print unit entirely.
- Step 2: loosen the green ribbon guide (3) by pressing downwards.
- Step 3: lift the ribbon cassette (4) by rotation as shown in the picture below.
- Step 4: take the ribbon cassette (4) out of the printer.
- Power the printer off.

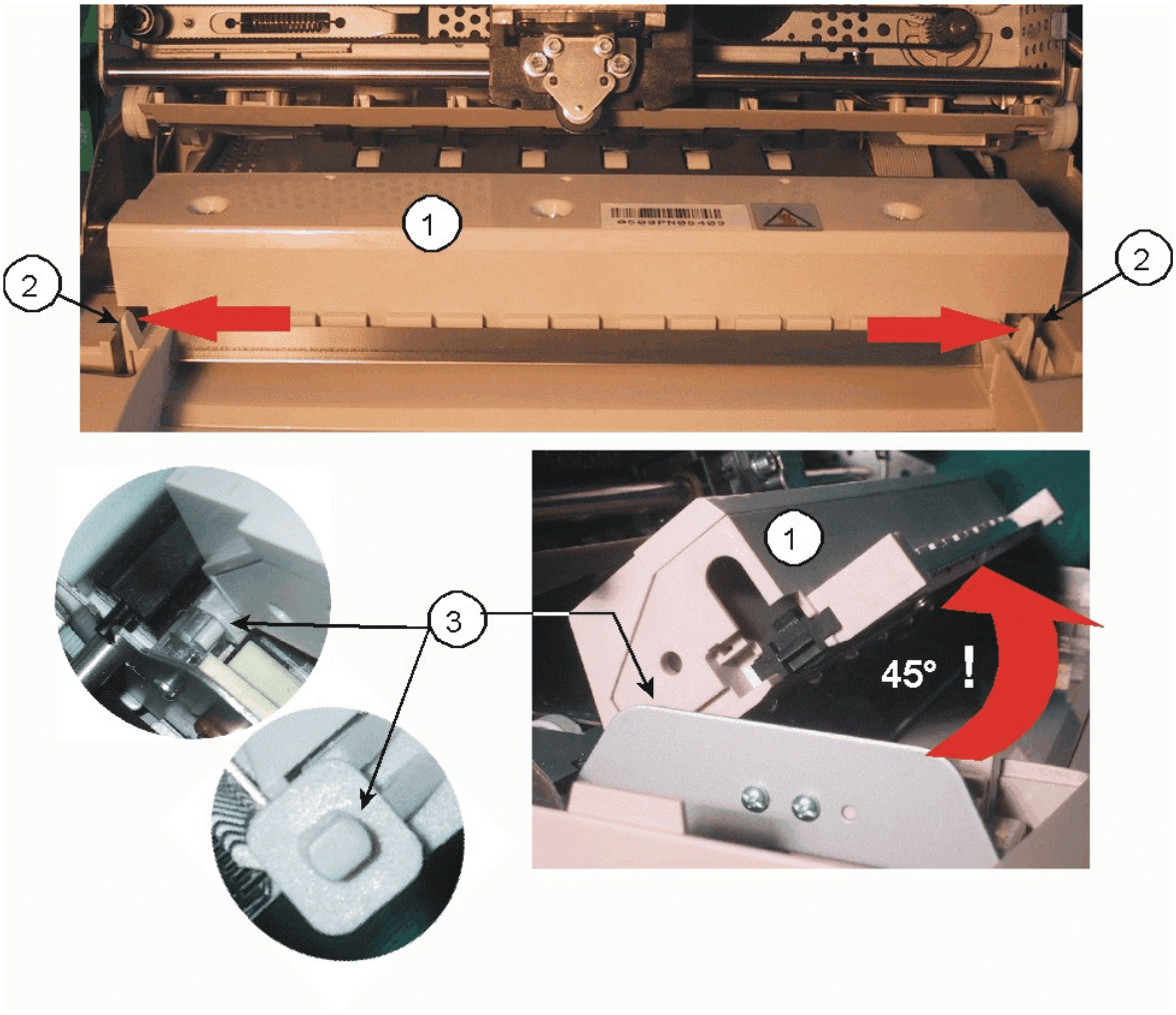
Caution: The print head may by very hot immediately after printing.



4.1.2 Remove the Alignment Unit

- Power the printer off
- Open the Top Cover
- Swivel the green print unit lift handle (see the photo on the page before) backwards to lift the print unit entirely.
- Press both Levers (2) to the outside of the printer
- Swivel the Alignment Unit up to about **45°**. Now the Pins (3) on both sides of the
- Alignment Unit (1) are in the correct position.
- Lift the Alignment Unit (1) out of the printer.

Note: Both pins (3) are flatten and so it is only possible to take out the Alignment Unit in an angle of **45°**!



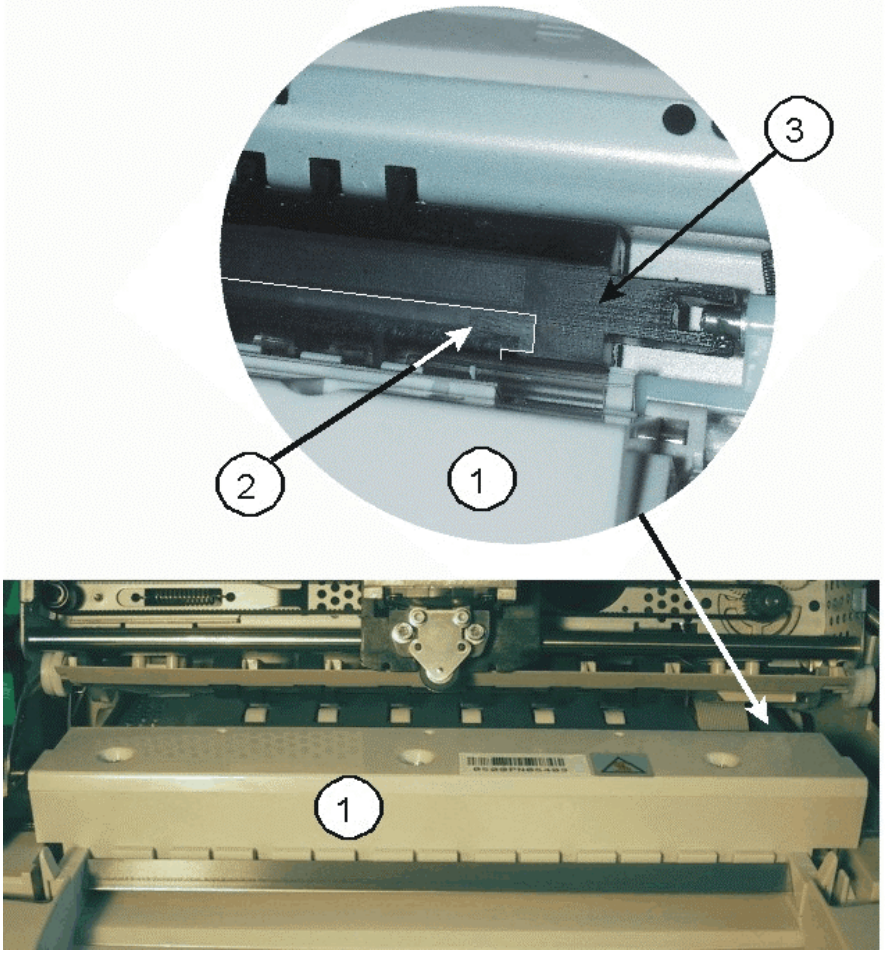
4.1.3 Cleaning Procedure

- Thoroughly brush and vacuum all accessible areas to any paper flock and dust.
- Clean the black platen's surface, the transport rollers.
- Clean also the rollers on the lower side of the Alignment Unit.
- Clean the covers and operator panel with damp, lint-free cloth. Do not use some cleaning solvents or excessive amount of water.

4.1.4 Install the Alignment

- Mount the Alignment Unit. Execute the removing procedure in reverse sequence.

Attention: Take care that the foil (2) at the rear side of the Alignment Unit (1) will not be damaged and is flat over the Print Bar (3)!



4.1.5 Install the Ribbon Cassette

- Insert the Ribbon Cassette. (see paragraph **1.5**)
- Swivel down the Print Unit with the green print unit lift handle to its normal position.
- Close the Top Cover.
- Connect the Power Cord.

5. Options

5.1 Optional Devices

Following optional devices can be provided:
- Serial interface port 2
- USB interface (in preparation)

Add the second interface port
Printer has basic configuration of one standard serial and parallel communication interface. At the rear of printer there is a second interface installation slot, this slot is be used in the standard Version by the parallel interface. A special version of **C-650 Plus** can be provide without the parallel interface port.

This slot can be used than for option boards and cards as below:
- Second serial interface board and USB interface board
- Second serial interface board or
- USB interface board

Note: When printer equipped with second or more other data communication interface boards, interface working mode can be selected by menu setup configuration.

- **Working with single communication port**
  - Printer can only work according to the interface mode and emulation selected by menu configuration, even if the printer has been equipped with more interface boards.
- **Working with dual-port**
  - If the printer has been equipped with option interface board, the operator can set up printer working mode to be dual-port mode through the operator panel to meet different usage requirements.

  - If the printer has been installed second serial port board and USB interface board, there are only two serial ports(first serial port and second serial port) can work synchronously. Under this configuration, printer can check which port is active. Any one of these two ports, if its data has been received, printer will be under the control of this port, and be kept in this state till this port task is end. Two ports are independent. And two ports have the same configuration except emulation mode. Emulation mode can be shifted by commands.

  - If printer has been installed with second parallel interface board and configured as dual-port activity, it will check which port buffer has data. If any one of these two ports detect data has been received, printer will be under the control of the port and it will be kept in this state till port task is end. Dual-port functionality and corresponding parameters can be selected though operator panel. Under the especial circumstance, each port can have its own emulation mode, and using commands can shift emulation mode.

  - If printer hardware configuration has two interface and the setup item interface in the menu is UAL then it can print out two interface corresponding emulation configuration in self-test sheet. Printer can set which port to be active and emulation mode according to host communication port.

6. Technical Data

6.1 Technical Specification

Printhead:
- Number of needles: 24
- Needle Diameter: 0.25 mm
- Needle Material: tungsten carbide
- Needle alignment: staggered two lines, 12+12
- Matrix form: diamond-shaped
- Multi-copy print: 1+6
- Thermal protection: PTC
- Life of print head: >600 million dots/needle

Font:
- Latin character: HSD, Draft, Roman, Sans Serif, Italic, OCR-A, OCR-B, E13B.
- UNICODE and BIG-5 traditional Chinese character.

Character Set:
- ASCII character: 54 codepages

CPI:
- ASCII character:
  10CPI, 12CPI, 13.8CPI, 15CPI, 16.6CPI, 17.1CPI, 18CPI, 20CPI

LPI: 1/5", 1/6", 1/8", n/72", n/180", n/216", n/240", n/360"

Printing Speed:

	HSD	Draft	NLQ	LQ
ASCII Character (CPS)	400	300	150	100

Form Feed Speed: 32 cm/s

Alignment Speed: <0.3 s

Bar Code Printing: EAN 8, EAN 13, UPC-A, UPC-E, Code 39, Code 128, Codabar, 2 of 5 industrial, 2 of 5 interleaved

Graphics Dot Matrix Density:
- 9 needles: 60 DPI, 72 DPI, 80 DPI, 96 DPI, 120 DPI, 240 DPI
- 24 needles: 60 DPI, 120 DPI, 180 DPI, 240 DPI, 360 DPI

Machine ID: each machine has an unique ID Number.

Diagnose:
- Self-diagnose,
- Hex print,
- Remote interrupt by interface,
- Remote intelligence service by interface,
- Self-test when power on.

Ribbon Cassette:
- Ribbon: black fabric
- Ribbon Length: 18 m
- Ribbon Width: 7 mm
- Useful ribbon Life: 5 million characters (HSD)

Machine Character:
- Dimensions: 398 x 296 x 215 mm (W x D x H)
- Weight: 9.0 kg (Basic Model)

Electric Character:
- Rated Voltage: 220 VAC ± 10%
- Frequency: 50 HZ / 60 HZ
- Power Consumption: operating approx. 170 W (max), 15 W Standby

Environment:
- Temperature: 5 - 35° C
- Humidity: 15 - 85% (no frost)
- Noise level: < 54 dBA acc. to ISO 7799

Quality Characteristics:
- MTBF: >=10,000 hours
- EMC and radio interference character: acc. to CCC.

6.2 Document Specification and Technical Instruction

Disposable Form:
- Single sheet or multi-copy paper
- Bill (card)

Caution: **If the print media does not accord to the above character, you have to discriminate it carefully before you use it.**

Printing Media Character:
- Input media handwork
- Margin align automatically
- Max thickness 2.2 mm
- Max width 245 mm
- Max length per line 10 CPI (238 mm)

- Standard of top of page of document (measured from the character's bottom):
  - **C-650 Plus** emulation = 4.3 mm
  - IBM PP II = 4.3 mm

- The min distance from the last basic printing line to the page bottom margin:
  - 5 mm (0.2 inch)

  - Min value of document rear (measured from the character bottom):
  - **C-650 Plus** emulation = 3.1 mm
  - IBM PP II = 10 mm

- Left and right margin value of document LH/RH:
  - min 3.1 mm ± 0.3 mm

- Min distance between last basic line character above the cord and horizontal cord:
  - 5 mm

- Min distance between last basic line character below the cord and horizontal cord:
  - 8 mm

- Distance between character Axial wire and vertical cord
  - 5.08 mm

Document

- **Single and multi-copy Sheet**:
  - Max width 245 mm
  - Min width 80 mm
  - Suggested max length 297 mm
  - Permitted max length 450 mm
  - Single sheet weight: 45 g - 160 g/m² (when you set the **SPECIAL FORM** to **YES**, it can print thin paper with above 35 g/m²)
  - Thickness of single sheet 0.06 mm - 0.28 mm
  - Weight of original and duplicated document 40 - 60 g/m²
  - Weight of carbon 20 - 34 g/m²
  - Max number of duplicated document 1+ 4 (paper weight equal average document value)
  - Recommended weight original 50 g/m²
last copy 60 g/m²
  - Multicopy gluing At the top or on the side
  - Max paper weight of multicopy forms 380 g/m²
  - Printing quality (with multicopy forms) LQ or NLQ

- **Document**
  - Single/multi copy
  - Min length 70 mm

7. Interface Description

7.1 Serial Interface

Standard **C-650 Plus** has one asynchronous V24 RS232C serial interface with 9 cores connected to the host.

Technical Character:

The following parameters can be modified in SETUP:

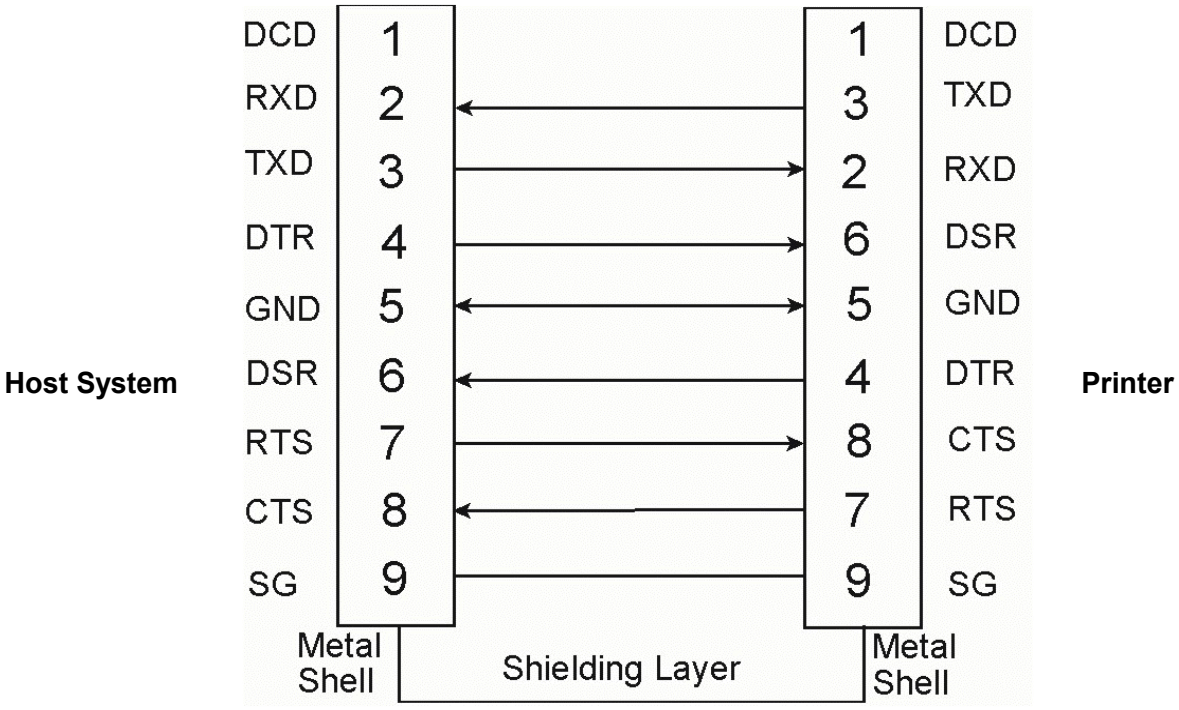
- BAUD RATE: 2400, 4800, 9600, 19200 (bit/s)
- BITS/CHARACTER: 7 or 8 bits
- STOP BITS: 1 or 2 bits
- PARITY: none, even or odd.
- DSR: YES or NO

Communication Cable:

- HOST: 9 PINS (DB-9S)
- PRINTER: 9 PINS (DB-9S)

This protocol uses the following signal lines:

- Receive Data (RXD)
- Transmit Data (TXD)
- Data Terminal Ready (DTR)
- Projective Ground (GND)
- Data Set Ready (DSR)
- Clear To Send (CTS)
- Ready to send (RTS)
- Signal Ground (SG)



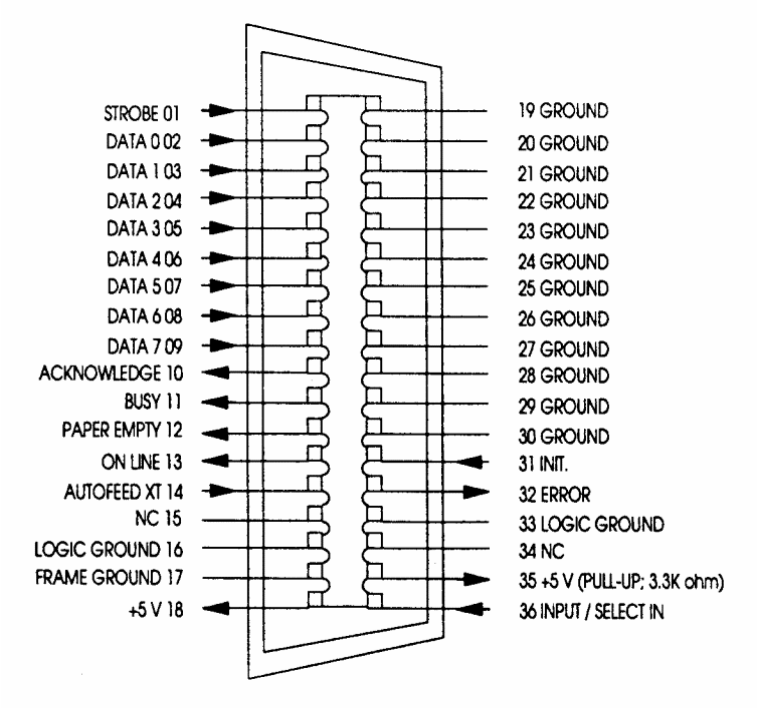
7.2 Parallel Interface

The C-650 Plus parallel interface according to IEEE 1284-1994 standard, support SPP, nibble, byte protocol.
Instruction of parallel interface as follows:

Technical Character:

- Compatibility: CENTRONICS
- Logic circuit: TTL
- Data format: 7 or 8 bits
- Logic level: 0 - 5 V
- Connector: 36 pins

All the input and output signal was connected to a 5V voltage by a 2.2k ohm resistance
Interface signal:



7.3 USB Interface (in preparation)

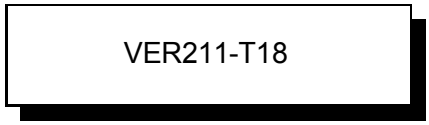
- USB characters
- Type: terminal
- Reference standard: Universal Serial Bus
- Transmission speed: $ 200 kbps

8. Firmware Update

Output Solutions will advise users to update the printer's firmware irregularly to strengthen C-650 Plus' functions and will offer the necessary firmware file to users (usually the firmware file is named ***flash.mot***).

To update C-650 Plus' firmware please follow the steps below:

- Copy the firmware file ***flash.mot*** to a Personal Computer.
- Connect C-650 Plus to one of the PC's parallel ports (usually LTP1 port), and power on
- the PC.
- Connect a 220-V power line to the **C-650 Plus** printer.
- Press the **[STOP □]** key and push the **power button** together to power on the C-650
- Plus.
- Do not release the **[STOP □]** key until the current firmware's edition is displayed on the printer's LCD.



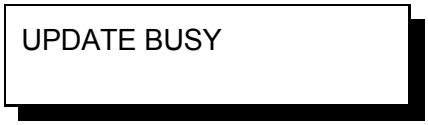
- Hold on to press the **[STOP □]** key until LCD shows as:

- After LCD's displaying become stable, you can release the **[STOP □]** key and the LCD will display "PROGRAM UPDATE".

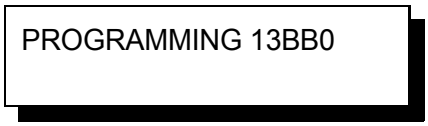
- Copy the firmware file ***flash.mot*** binary to the PC's parallel port, which is connected to the **C-650 Plus**. Usually we suggest the user to use the command under MS-DOS like this:

c:\>copy flash.mot lpt1 /b

- Now the downloading process will begin.



- During the downloading process **C-650 Plus'** LCD will display how many bytes the printer has received.



- The whole downloading process will last about three minutes. After updating is finished successfully, LCD shows:

- Now the **C-650 Plus** will automatically reset after downloading process finished.
- Firmware upgrading finished after **C-650 Plus'** automatically resetting finish and **C-650 Plus** can be used normally.

Warning: Power off during the process of firmware upgrading is forbidden, otherwise the printer will be destroyed.

9. Troubleshooting

How to Use This Section

There are some examples which will help you to solve the printer troubles that may occur during use.

Warning: **If there are mechanical or electrical troubles, don't repair by yourself. Ask your service centre for help.**
If you cannot find the troubles in the following pages, please contact your local service office for technical support.

1. Find the category in which your problem occurs. The problem categories are:
   - Power-related Problems
   - Uncompleted Power On
   - Ribbon or Carriage related Problems
   - Paper-related Problems
   - Print-related Problems
   - No Printout
2. Find the symptom description that most closely matches the printer symptom.
3. Try the first suggestion under that heading.
4. If the suggestion does not cure the problem, try the next suggestion.
5. If none of the suggestions enable you to continue printing, or if the fault is not listed, contact your service office.

9.1 Power-related Problems

- The power indicator does not come on when power is switched on.
- Check that the power cord and plug are securely fitted to the printer and to an electrical outlet.
- Ask for the power connector connections to be verified.
- Ask for the building electrical supply to be verified.

9.2 Uncompleted Power On

After you powered on the printer, the printhead does not return to the left edge, which means the printer did not finish the internal self test.

- Check whether the component used to protect the printhead and the sponge have been removed or not.
- Check if there is any object which is blocking the motor.
- Check whether the top cover is closed or not.
- Restart the printer to try again.
- Check whether the printhead moves smoothly or not.
- Check whether the ribbon box is settled correctly or not.

9.3 Ribbon or Carriage-related Problems

- **Ribbon Problems**
  - Make sure that the ribbon is:
    - Stretched correctly;
    - Not worn thin or dry;
    - Not torn or damaged in any other way;
    - Not jammed
  - If the ribbon box is damaged, replace it with a new one.

- **Carriage does not move smoothly**
  - Examine the paper pathway. Remove any obstructions. Check that all packing material is removed.
  - Examine the carriage area for obstructions. Remove where necessary.

9.4 Paper-related Problems

- **The printer does not accept the sheet**
  - Check whether the document is within specifications or not.
  - Check whether the document is inserted and aligned correctly or not.

  - **Fanfold Paper is not positioned at perforation for tear-off feature**
  - Select the correct form length using the Setup feature.
  - Reset top of form by performing a parking function.

- **Paper tears or jams**
  - Examine the paper path; remove any

    Note: To clean the paper path remove the Alignment Unit as described in **paragraph 4.1.2**.

  - Paper is ropy, such as crimp.
  - Multi-carbon does not bond well together.
  - Too thick, too thin or too many sheets of paper.
  - There is residue of paper or fibre on the printing media.
  - Paper with clip or pin (which would damage the printer seriously)

    Note: See **paragraph 6.2 Document Specification**.

- **Paper jam with printer including the optional Tractor Unit**
  - Is the fanfold paper too loose or too taut between the tractors?
  - If the holes in the paper are deformed at their outer edges, the paper is too taut.
  - If the paper rises between the tractors, it is too loose.
  - Readjust the tractor spacing so that the paper lies smoothly but without any tension.
  - Ensure that the paper is horizontally aligned on the pins.

9.5 Print-related Problems

Note: The **C-650 Plus** printer has the function of overheating protection. If overheating protection will be active the printer may slow down printing speed or even stop printing after a long time printing (until printhead's temperature returns normal). This function can prevent print head from being destroyed if print head is over heated.

- **Print faint or of poor quality.**
  - Have you used the correct paper? See Chapter 6 **Technical Data** which contains a full specification of the paper you can use. Replace the paper if it does not match the specification.
  - Make sure that the ribbon is stretched correctly.
  - Does the ribbon need changing? Replace it with a new ribbon if necessary.
  - Is the ribbon cartridge properly installed? Adjust as necessary.
- **Characters do not print evenly or are not uniform in pitch**
  - Examine the paper pathway for dirt or other obstruction that may cause the gap between print head and platen to vary. Remove the obstruction.
  - Incorrect installation of ribbon box or the ribbon tied.
- **Part of printed text is missing (loss of data)**
  - If you are using serial communication check the buffer control setting in Setup.
  - Check the data flow control setting on the host computer.
- **Dot Missing**
  - If white lines appear on characters at certain fixed position, there are probably several needles broken or crooked. When this happens, please contact your printer supplier to replace the damaged printhead.

Note: **Please avoid printing on the edge of the paper! It may cause printer needle broken**.

9.6 No Printout

- **Self-test printout does not start**
  - Make sure that you have closed the cover.
  - Check if paper is loaded in the printer.
  - Check if ribbon cassette is installed correctly on

- **Printing does not start**
  - Check if the physics and logic connection between printer and host system are correct and at least one LED should be light.
  - Check if LCD displays **ON LINE** and check if the communication interface parameters have been set up correctly.
  - Make sure that the printer is connected to the host computer. (Refer to Paragraph
  - 1.8 **Connection to the System**). Make sure that connectors are properly fixed at both ends.
  - Make sure that the printer is receiving data from the host computer.
  - Make sure that the correct protocol is enabled.
  - Make sure that you have selected the correct port (if the automatic feature has not been selected).
  - Make sure that paper is loaded.
  - Make sure that the ribbon is installed.
  - Examine the ribbon path. Does the ribbon pass in front of the whole printhead? Adjust the ribbon if necessary.

Appendix A Code Pages

Code page of **C-650 Plus**

IBM/PC Character Set			
nnn	**PC Character Set**	**nnn**	**ISO Character Set**
“700”	PC-437 International	“600”	ISO 8859/1 Latin 1
“701”	PC-220 Spain 2	“602”	ISO 8859/9 Latin 5
“710”	PC-865 North Europe (Sweden)	“605”	ISO 8859/2 Latin 2
“711”	PC- DK/N Denmark / Norway	“615”	ISO 8859/5 Slavic
“712”	PC-DK Denmark	“617”	ISO 8859/15
“720”	PC-860 Portugal	“620”	ISO 8859/6 Arabia
“730”	PC-863 Canada (French)	“623”	ISO 8859/7 Greece
“740”	PC-850 Latin 1	“625”	ISO 8859/8 Hebrew
“741”	PC-858 Europe	“680”	OLI-UNIX
“742”	PC-857 Latin 5		
“750”	PC-852 Latin 2		
“770”	PC-851 Greece		
“771”	PC-210 Greece *		
“780”	PC-855 Slavic		
“781”	PC-862 Israel		
“782”	PC-864 Arabia		
“783”	PC-866 Slavic		
“640”	PC-WIN Latin 1		
“645”	PC-WIN Latin 2		
“910”	CHINA		
“911”	CHN2		
“912”	PC-866-BG(Bulgaria)		
“913”	PC-Ger.(Germany)		

A.1 PC Character Sets

PC CHAR SET

437(INT)

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0				0	@	P	`	p	Ç	É	á	▒	└	╨	α	≡
1			!	1	A	Q	a	q	ü	æ	í	▓	┴	╤	ß	±
2			"	2	B	R	b	r	é	Æ	ó	▓	┬	╥	Γ	≥
3	♥		#	3	C	S	c	s	â	ô	ú	│	├	╙	π	≤
4	◆		$	4	D	T	d	t	ä	ö	ñ	┤	─	╘	Σ	⌠
5	♣	§	%	5	E	U	e	u	à	ò	Ñ	╡	┼	╒	σ	⌡
6	♠		&	6	F	V	f	v	å	û	ª	╢	╞	╓	µ	÷
7			'	7	G	W	g	w	ç	ù	º	╖	╟	╫	τ	≈
8			(	8	H	X	h	x	ê	ÿ	¿	╕	╚	╪	Φ	°
9			)	9	I	Y	i	y	ë	Ö	⌐	╣	╔	┘	Θ	∙
A			*	:	J	Z	j	z	è	Ü	¬	║	╩	┌	Ω	·
B			+	;	K	[	k	{	ï	¢	½	╗	╦	█	δ	√
C			,	<	L	\	l	|	î	£	¼	╝	╠	▄	∞	n
D			−	=	M	]	m	}	ì	¥	¡	╜	═	▌	ø	²
E			.	>	N	^	n	~	Ä	₧	«	╛	╬	▐	ε	■
F			/	?	O	_	o		Å	ƒ	»	┐	╧	▀	∩	

PC CHAR SET

220(E)

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0				0	@	P	`	p	Ç	É	á	▒	└	╨	α	≡
1			!	1	A	Q	a	q	ü	Í	í	▓	┴	╤	β	±
2			"	2	B	R	b	r	é	Ó	ó	▓	┬	╥	Γ	≥
3	♥		#	3	C	S	c	s	â	ô	ú	│	├	╙	π	≤
4	◆		$	4	D	T	d	t	ä	ö	ñ	┤	─	╘	Σ	⌠
5	♣	§	%	5	E	U	e	u	à	ò	Ñ	╡	┼	╒	σ	⌡
6	♠		&	6	F	V	f	v	À	û	ª	╢	╞	╓	µ	÷
7			'	7	G	W	g	w	ç	ù	º	╖	╟	╫	τ	≈
8			(	8	H	X	h	x	ê	Á	¿	╕	╚	╪	Φ	°
9			)	9	I	Y	i	y	ë	Ö	⌐	╣	╔	┘	Θ	∙
A			*	:	J	Z	j	z	è	Ü	¬	║	╩	┌	Ω	·
B			+	;	K	[	k	{	ï	Ø	½	╗	╦	█	δ	√
C			,	<	L	\	l	|	î	£	¼	╝	╠	▄	∞	n
D			-	=	M	]	m	}	ì	Ú	¡	╜	═	▌	ø	²
E			.	>	N	^	n	~	Ä	₧	«	╛	╬	▐	ε	■
F			/	?	O	_	o		È	Ï	»	┐	╧	▀	∩	

PC CHAR SET

865(NORDIC)

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0				0	@	P	`	p	Ç	É	á	▒	└	╨	α	≡
1			!	1	A	Q	a	q	ü	æ	í	▓	┴	╤	ß	±
2			"	2	B	R	b	r	é	Æ	ó	▓	┬	╥	Γ	≥
3	♥		#	3	C	S	c	s	â	ô	ú	│	├	╙	π	≤
4	◆		$	4	D	T	d	t	ä	ö	ñ	┤	─	╘	Σ	⌠
5	♣	§	%	5	E	U	e	u	à	ò	Ñ	╡	┼	╒	σ	⌡
6	♠		&	6	F	V	f	v	å	û	ª	╢	╞	╓	µ	÷
7			'	7	G	W	g	w	ç	ù	º	╖	╟	╫	τ	≈
8			(	8	H	X	h	x	ê	ÿ	¿	╕	╚	╪	Φ	°
9			)	9	I	Y	i	y	ë	Ö	⌐	╣	╔	┘	Θ	∙
A			*	:	J	Z	j	z	è	Ü	¬	║	╩	┌	Ω	·
B			+	;	K	[	k	{	ï	ø	½	╗	╦	▉	δ	√
C			,	<	L	\	l	|	î	£	¼	╝	╠	▄	∞	n
D			−	=	M	]	m	}	ì	Ø	¡	╜	═	▌	ø	²
E			.	>	N	^	n	~	Ä	₧	«	╛	╬	▐	ε	■
F			/	?	O	_	o		Å	ƒ	¤	┐	╧	▀	∩	

PC CHAR SET

DK/N

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0				0	@	P	`	p	Ç	É	á	▒	└	╨	α	≡
1			!	1	A	Q	a	q	ü	æ	í	▓	┴	╤	β	±
2			"	2	B	R	b	r	é	Æ	ó	▓	┬	╥	Γ	≥
3	♥		#	3	C	S	c	s	â	ô	ú	│	├	╙	π	≤
4	◆		$	4	D	T	d	t	ä	ö	ñ	┤	─	╘	Σ	⌠
5	♣	§	%	5	E	U	e	u	à	ò	Ñ	╡	┼	╒	σ	⌡
6	♠		&	6	F	V	f	v	å	û	õ	╢	╞	╓	µ	÷
7			'	7	G	W	g	w	ç	ù	Õ	╖	╟	╫	τ	≈
8			(	8	H	X	h	x	ê	ÿ	¿	╕	╚	╪	Φ	°
9			)	9	I	Y	i	y	ë	Ö	ã	╣	╔	┘	Θ	∙
A			*	:	J	Z	j	z	è	Ü	Ã	║	╩	┌	Ω	·
B			+	;	K	[	k	{	ï	ø	ℓ	╗	╦	█	δ	√
C			,	<	L	\	l	|	î	£	ℏ	╝	╠	▄	∞	n
D			−	=	M	]	m	}	ì	Ø	¡	╜	═	▌	ø	²
E			.	>	N	^	n	~	Ä	Ł	³	╛	╬	▐	ε	■
F			/	?	O	_	o		Å	ł	¤	┐	╧	▀	∩	

PC CHAR SET

DK

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0				0	@	P	`	p	Ç	É	á	▒	└	╨	α	≡
1			!	1	A	Q	a	q	ü	æ	í	▓	┴	╤	β	±
2			"	2	B	R	b	r	é	Æ	ó	▓	┬	╥	Γ	≥
3	♥		#	3	C	S	c	s	â	ô	ú	│	├	╙	π	≤
4	◆		$	4	D	T	d	t	ä	ö	ñ	┤	─	╘	Σ	⌠
5	♣	§	%	5	E	U	e	u	à	ò	Ñ	╡	┼	╒	σ	⌡
6	♠		&	6	F	V	f	v	å	û	õ	╢	╞	╓	µ	÷
7			'	7	G	W	g	w	ç	ù	Õ	╖	╟	╫	τ	≈
8			(	8	H	X	h	x	ê	ÿ	¿	╕	╚	╪	Φ	°
9			)	9	I	Y	i	y	ë	Ö	ã	╣	╔	┘	Θ	∙
A			*	:	J	Z	j	z	è	Ü	Ã	║	╩	┌	Ω	·
B			+	;	K	Æ	k	æ	ï	ø	ℓ	╗	╦	▄	δ	√
C			,	<	L	Ø	l	ø	î	£	ʼn	╝	╠	▀	∞	n
D			−	=	M	Å	m	å	ì	Ø	¡	╜	═	▌	ø	²
E			.	>	N	^	n	~	Ä	Ł	³	╛	╬	▐	ε	■
F			/	?	O	_	o		Å	l·	¤	┐	╧	▄	∩	

PC CHAR SET

860(P)

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0				0	@	P	`	p	Ç	É	á	▒	└	╨	α	≡
1			!	1	A	Q	a	q	ü	À	í	▓	┴	╤	β	±
2			"	2	B	R	b	r	é	È	ó	▓	┬	╥	Γ	≥
3	♥		#	3	C	S	c	s	â	ô	ú	│	├	╙	π	≤
4	◆		$	4	D	T	d	t	ã	õ	ñ	┤	─	╘	Σ	⌠
5	♣	§	%	5	E	U	e	u	à	ò	Ñ	╡	┼	╒	σ	⌡
6	♠		&	6	F	V	f	v	Á	Ú	ª	╢	╞	╓	µ	÷
7			'	7	G	W	g	w	ç	ù	º	╖	╟	╫	τ	≈
8			(	8	H	X	h	x	ê	Ì	¿	╕	╚	╪	Φ	°
9			)	9	I	Y	i	y	Ê	Õ	ò	╣	╔	┘	Θ	∙
A			*	:	J	Z	j	z	è	Ü	¬	║	╩	┌	Ω	·
B			+	;	K	[	k	{	Í	¢	½	╗	╦	█	δ	√
C			,	<	L	\	l	|	Ô	£	¼	╝	╠	▄	∞	n
D			-	=	M	]	m	}	ì	Ù	¡	╜	═	▌	ø	²
E			.	>	N	^	n	~	Ã	₧	«	╛	╬	▐	ε	■
F			/	?	O	_	o		Â	Ó	»	┐	╧	▀	∩	

PC CHAR SET

863(CAN. FR.)

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0				0	@	P	`	p	Ç	É	¦	▒	└	╨	α	≡
1			!	1	A	Q	a	q	ü	È	´	▓	┴	╤	ß	±
2			"	2	B	R	b	r	é	Ê	ó	▓	┬	╥	Γ	≥
3	♥		#	3	C	S	c	s	â	ô	ú	│	├	╙	π	≤
4	♦		$	4	D	T	d	t	Â	Ë	¨	┤	─	╘	Σ	⌠
5	♣	§	%	5	E	U	e	u	à	Ï	¸	╡	┼	╒	σ	⌡
6	♠		&	6	F	V	f	v	¶	û	³	╢	╞	╓	µ	÷
7			'	7	G	W	g	w	ç	ù	¯	╖	╟	╫	τ	≈
8			(	8	H	X	h	x	ê	¤	Î	╕	╚	╪	Φ	°
9			)	9	I	Y	i	y	ë	Ô	⌐	╣	╔	┘	Θ	∙
A			*	:	J	Z	j	z	è	Ü	¬	║	╩	┌	Ω	·
B			+	;	K	[	k	{	ï	¢	½	╗	╦	█	δ	√
C			,	<	L	\	l	|	î	£	¼	╝	╠	▄	∞	n
D			−	=	M	]	m	}	‗	Ù	¾	╜	═	▌	ø	²
E			.	>	N	^	n	~	À	Ô	«	╛	╬	▐	ε	■
F			/	?	O	_	o		§	ƒ	»	┐	╧	▀	∩	

PC CHAR SET

850(LATIN 1)

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0				0	@	P	`	p	Ç	É	á	▒	└	ð	Ó	-
1			!	1	A	Q	a	q	ü	æ	í	▓	┴	Ð	ß	±
2			"	2	B	R	b	r	é	Æ	ó	▓	┬	Ê	Ô	‗
3	♥		#	3	C	S	c	s	â	ô	ú	│	├	Ë	Ò	¾
4	♦		$	4	D	T	d	t	ä	ö	ñ	┤	─	È	õ	¶
5	♣	§	%	5	E	U	e	u	à	ò	Ñ	Á	┼	ı	Õ	§
6	♠		&	6	F	V	f	v	å	û	ª	Â	ã	Í	µ	÷
7			'	7	G	W	g	w	ç	ù	º	À	Ã	Î	þ	¸
8			(	8	H	X	h	x	ê	ÿ	¿	©	╚	Ï	Þ	°
9			)	9	I	Y	i	y	ë	Ö	®	╣	╔	┘	Ú	¨
A			*	:	J	Z	j	z	è	Ü	¬	║	╩	┌	Û	·
B			+	;	K	[	k	{	ï	ø	½	╗	╦	█	Ù	¹
C			,	<	L	\	l	|	î	£	¼	╝	╠	▄	ý	³
D			-	=	M	]	m	}	ì	Ø	¡	¢	═	¦	Ý	²
E			.	>	N	^	n	~	Ä	×	«	¥	╬	Ì	¯	■
F			/	?	O	_	o		Å	ƒ	»	┐	¤	■	´	

PC CHAR SET

858(LATIN EURO)

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0				0	@	P	`	p	Ç	É	á	▒	└	ð	Ó	-
1			!	1	A	Q	a	q	ü	æ	í	▓	┴	Ð	ß	±
2			"	2	B	R	b	r	é	Æ	ó	▓	┬	Ê	Ô	‗
3	♥		#	3	C	S	c	s	â	ô	ú	│	├	Ë	Ò	¾
4	♦		$	4	D	T	d	t	ä	ö	ñ	┤	─	È	õ	¶
5	♣	§	%	5	E	U	e	u	à	ò	Ñ	Á	┼	€	Õ	§
6	♠		&	6	F	V	f	v	å	û	ª	Â	ã	Í	µ	÷
7			'	7	G	W	g	w	ç	ù	º	À	Ã	Î	þ	¸
8			(	8	H	X	h	x	ê	ÿ	¿	©	╚	Ï	Þ	°
9			)	9	I	Y	i	y	ë	Ö	®	╣	╔	┘	Ú	¨
A			*	:	J	Z	j	z	è	Ü	¬	║	╩	┌	Û	·
B			+	;	K	[	k	{	ï	ø	½	╗	╦	█	Ù	¹
C			,	<	L	\	l	|	î	£	¼	╝	╠	▄	ý	³
D			-	=	M	]	m	}	ì	Ø	¡	¢	═	¦	Ý	²
E			.	>	N	^	n	~	Ä	×	«	¥	╬	Ì	¯	■
F			/	?	O	_	o		Å	ƒ	»	┐	¤	■	´	

PC CHAR SET

857(LATIN 5)

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0				0	@	P	`	p	Ç	É	á	▒	└	⩒	ó	-
1			!	1	A	Q	a	q	ü	æ	í	▓	┴	a	ß	±
2			"	2	B	R	b	r	é	Æ	ó	▓	┬	Ê	Ô	
3	♥		#	3	C	S	c	s	â	ô	ú	│	├	Ë	Ò	¾
4	♦		$	4	D	T	d	t	ä	ö	ñ	┤	─	È	õ	¶
5	♣	§	%	5	E	U	e	u	à	ò	Ñ	Á	┼		Õ	§
6	♠		&	6	F	V	f	v	å	û	Ğ	Â	ã	Í	µ	÷
7			'	7	G	W	g	w	ç	ù	ğ	À	Ã	Î		¸
8			(	8	H	X	h	x	ê	İ	¿	©	╚	Ï	×	°
9			)	9	I	Y	i	y	ë	Ö	®	╣	╔	┘	Ú	¨
A			*	:	J	Z	j	z	è	Ü	¬	║	╩	┌	Û	·
B			+	;	K	[	k	{	ï	ø	½	╗	╦	█	Ù	1
C			,	<	L	\	l	|	î	£	¼	╝	╠	▄	ì	3
D			-	=	M	]	m	}	ı	Ø	¡	¢	=	¦	ÿ	2
E			.	>	N	^	n	~	Ä	Ş	«	¥	╬	Ì	¯	■
F			/	?	O	_	o		Å	ş	»	┐	¤	■	´	

PC CHAR SET

852(LATIN 2)

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0				0	@	P	`	p	Ç	É	á	▒	└	đ	Ó	-
1			!	1	A	Q	a	q	ü	Ĺ	í	▓	┴	Đ	ß	˝
2			"	2	B	R	b	r	é	ĺ	ó	▓	┬	Ď	Ô	˛
3	♥		#	3	C	S	c	s	â	ô	ú	│	├	Ë	Ń	ˇ
4	◆		$	4	D	T	d	t	ä	ö	Ą	┤	─	ď	ń	˘
5	♣	§	%	5	E	U	e	u	ů	Ľ	ą	Á	┼	Ň	ň	§
6	♠		&	6	F	V	f	v	ć	ľ	Ž	Â	Ă	Í	Š	÷
7			'	7	G	W	g	w	ç	Ś	ž	Ě	ă	Î	š	¸
8			(	8	H	X	h	x	ł	ś	Ę	Ş	╚	ě	Ř	°
9			)	9	I	Y	i	y	ë	Ö	ę	╣	╔	┘	Ú	¨
A			*	:	J	Z	j	z	ő	Ü		║	╩	┌	ŕ	·
B			+	;	K	[	k	{	ő	Ť	ź	╗	╦	■	Ű	ű
C			,	<	L	\	l	|	î	ť	Č	╝	╠	■	ý	Ř
D			-	=	M	]	m	}	Ź	Ł	ş	Ż	=	ţ	Ý	ř
E			.	>	N	^	n	~	Ä	×	«	ż	╬	Ů	ţ	■
F			/	?	O	_	o		Ć	č	»	┐	¤	■	´	

PC CHAR SET

851(GREEK)

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0				0	@	P	`	p	Ç	Ί	ϊ	░	└	Τ	ζ	-
1			!	1	A	Q	a	q	ü		Ϊ	▒	┴	Υ	η	±
2			"	2	B	R	b	r	é	Ό	ó	▓	┬	Φ	θ	υ
3	♥		#	3	C	S	c	s	â	ô	ú	│	├	Χ	ι	φ
4	◆		$	4	D	T	d	t	ä	ö	Α	┤	─	Ψ	κ	χ
5	♣	§	%	5	E	U	e	u	à	Ύ	Β	Κ	┼	Ω	λ	§
6	♠		&	6	F	V	f	v	Ά	û	Γ	Λ	Π	α	μ	ψ
7			'	7	G	W	g	w	ç	ù	Δ	Μ	Ρ	β	ν	¸
8			(	8	H	X	h	x	ê	Ώ	Ε	Ν	╚	γ	ξ	°
9			)	9	I	Y	i	y	ë	Ö	Ζ	╣	╔	┘	ο	¨
A			*	:	J	Z	j	z	è	Ü	Η	║	╩	┌	π	ω
B			+	;	K	[	k	{	ï	ά	½	╗	╦	█	ρ	ü
C			,	<	L	\	l	|	î	£	Θ	╝	╠	▄	σ	ΰ
D			-	=	M	]	m	}	Έ	έ	Ι	Ξ	═	δ	ς	ώ
E			.	>	N	^	n	~	Ä	ή	«	Ο	╬	ε	τ	■
F			/	?	O	_	o		Ή	ί	»	╖	Σ	■	΄	

PC CHAR SET

210(GR)

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0				0	@	P	`	p	A	P	ι	▒	L	Ш	ω	Ω
1			!	1	A	Q	a	q	B	Σ	κ	▓	⊥	╤	ά	±
2			"	2	B	R	b	r	Γ	T	λ	▓	T	π	έ	≥
3	♥		#	3	C	S	c	s	Δ	Y	μ	│	├	Ш	ή	≤
4	◆		$	4	D	T	d	t	E	Φ	ν	┤	—	Ł	ϊ	⌠
5	♣	§	%	5	E	U	e	u	Z	X	ξ	╡	┼	F	ί	⌡
6	♠		&	6	F	V	f	v	H	Ψ	o	╢	╞	π	ό	÷
7			'	7	G	W	g	w	Θ	Ω	π	π	╟	╫	ύ	≈
8			(	8	H	X	h	x	I	α	ρ	╕	Ш	╪	ϋ	°
9			)	9	I	Y	i	y	K	β	σ	╣	╓	┘	ώ	£
A			*	:	J	Z	j	z	Λ	Y	ς	║	╨	┌	Ά	·
B			+	;	K	[	k	{	M	δ	τ	╗	╥	▉	Έ	√
C			,	<	L	\	l	|	N	ε	υ	╝	╙	▄	Ή	n
D			−	=	M	]	m	}	Ξ	ζ	φ	╜	=	▌	Ί	2
E			.	>	N	^	n	~	O	η	χ	╛	╘	▐	Ό	■
F			/	?	O	_	o		Π	θ	ψ	┐	╧	▀	Ύ	

PC CHAR SET

855(CYRILLIC)

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0				0	@	P	`	p	ђ	љ	а	▒	└	л	Я	-
1			!	1	A	Q	a	q	Ђ	Љ	А	▓	┴	Л	р	ы
2			"	2	B	R	b	r	ѓ	њ	б	▓	┬	м	Р	Ы
3	♥		#	3	C	S	c	s	Ѓ	Њ	Б	│	├	М	с	з
4	♦		$	4	D	T	d	t	ё	ћ	ц	┤	—	н	С	З
5	♣	§	%	5	E	U	e	u	Ё	Ћ	Ц	х	┼	Н	т	ш
6	♠		&	6	F	V	f	v	є	ќ	д	Х	к	о	Т	Ш
7			'	7	G	W	g	w	Є	Ќ	Д	и	К	О	у	э
8			(	8	H	X	h	x	s	ў	е	И	╚	п	У	Э
9			)	9	I	Y	i	y	S	Ў	Е	╣	╔	┘	ж	щ
A			*	:	J	Z	j	z	i	ц	ф	║	╩	┌	Ж	Щ
B			+	;	K	[	k	{	I	Ц	Ф	╗	╦	■	в	ч
C			,	<	L	\	l	|	ї	ю	г	╝	╠	▄	В	Ч
D			-	=	M	]	m	}	Ї	Ю	Г	й	=	╬	ь	
E			.	>	N	^	n	~	j	ъ	«	Й	╩	я	Ь	■
F			/	?	O	_	o		J	Ъ	»	┐	¤	■	№	

PC CHAR SET

862(IL)

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0				0	@	P	`	p	א	]	á	▒	└	╨	α	≡
1			!	1	A	Q	a	q	ב	ד	í	▓	┴	╤	ß	±
2			"	2	B	R	b	r	ג	ה	ó	▓	┬	╥	Γ	≥
3	♥		#	3	C	S	c	s	ד	ו	ú	┃	├	╙	π	≤
4	◆		$	4	D	T	d	t	ה	ז	ñ	┤	─	╘	Σ	⌠
5	♣	§	%	5	E	U	e	u	ו	ח	Ñ	╡	┼	╒	σ	⌡
6	♠		&	6	F	V	f	v	ז	ט	ª	╢	╞	╓	µ	÷
7			'	7	G	W	g	w	ח	י	º	╖	╟	╫	τ	≈
8			(	8	H	X	h	x	ט	ך	¿	╕	╚	╪	Φ	°
9			)	9	I	Y	i	y	י	ל	⌐	╣	╔	┘	Θ	∙
A			*	:	J	Z	j	z	ך	מ	¬	║	╩	┌	Ω	·
B			+	;	K	[	k	{	כ	נ	½	╗	╦	█	δ	√
C			,	<	L	\	l	|	ל	ס	¼	╝	╠	▄	∞	n
D			-	=	M	]	m	}	מ	ע	¡	╜	═	▌	ø	²
E			.	>	N	^	n	~	נ	פ	«	╛	╬	▐	ε	■
F			/	?	O	_	o		ן	צ	»	┐	╧	▀	∩	

PC CHAR SET

864(ARABIC)

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0				0	@	P	`	p	°	ß		•	¢	ذ	ـ	ّ
1			!	1	A	Q	a	q	▪	∞	–	ا	ء	ر	ف	ّ
2			"	2	B	R	b	r	·	ø	آ	٢	آ	ز	ق	ن
3	♬		#	3	C	S	c	s	√	±	£	٣	أ	س	ك	ه
4	☼		$	4	D	T	d	t		½	¤	٤	ؤ	ش	ل	ة
5	=	§	%	5	E	U	e	u	–	¼	ئ	٥	ج	ص	م	ى
6	‖		&	6	F	V	f	v	|	≈	إ	٦	ئ	ض	ن	ي
7			'	7	G	W	g	w	┼	«	ـإ	٧	ا	ط	ه	غ
8			(	8	H	X	h	x	┤	»	ا	٨	ب	ظ	و	ق
9			)	9	I	Y	i	y	┬	لأ	ب	٩	ة	ع	ى	لآ
A			*	:	J	Z	j	z	├	لأ	ن	ف	ن	غ	ب	لآ
B			+	;	K	[	k	{	┴		ث	؛	ت	¦	ض	ل
C			,	<	L	\	l	|	┐		،	س	ج	¬	ع	ك
D			–	=	M	]	m	}	┌	لا	ج	ش	ح	÷	غ	ي
E			.	>	N	^	n	~	└	لا	ح	ص	خ	×	غ	■
F			/	?	O	_	o		┘	،	خ	؟	د	ع	م	

PC CHAR SET

866(CYRILLIC)

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0				0	@	P	`	p	А	Р	а	▒	└	Ш	р	Ё
1			!	1	A	Q	a	q	Б	С	б	▓	┴	╤	с	ё
2			"	2	B	R	b	r	В	Т	в	▓	┬	╥	т	Є
3	♥		#	3	C	S	c	s	Г	У	г	│	├	Ц	у	є
4	◆		$	4	D	T	d	t	Д	Ф	д	┤	─	┼	ф	Ї
5	♣	§	%	5	E	U	e	u	Е	Х	е	╡	┼	╞	х	ї
6	♠		&	6	F	V	f	v	Ж	Ц	ж	╢	╞	╥	ц	Ў
7			'	7	G	W	g	w	З	Ч	з	╖	╟	╫	ч	ў
8			(	8	H	X	h	x	И	Ш	и	╕	╚	╪	ш	°
9			)	9	I	Y	i	y	Й	Щ	й	╣	╔	┘	щ	∙
A			*	:	J	Z	j	z	К	Ъ	к	║	╩	┌	ъ	·
B			+	;	K	[	k	{	Л	Ы	л	╗	╦	█	ы	√
C			,	<	L	\	l	|	М	Ь	м	╝	╠	▄	ь	№
D			−	=	M	]	m	}	Н	Э	н	╜	═	▌	э	¤
E			.	>	N	^	n	~	О	Ю	о	╛	╬	▐	ю	■
F			/	?	O	_	o		П	Я	п	┐	╧	▀	я	

PC CHAR SET

1252(PC-WIN LATIN1)

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0				0	@	P	`	p	€			°	À	Ð	à	ð
1			!	1	A	Q	a	q		‘	¡	±	Á	Ñ	á	ñ
2			"	2	B	R	b	r	,	’	¢	²	Â	Ò	â	ò
3			#	3	C	S	c	s	ƒ	“	£	³	Ã	Ó	ã	ó
4			$	4	D	T	d	t	„	”	¤	´	Ä	Ô	ä	ô
5			%	5	E	U	e	u	…	•	¥	µ	Å	Õ	å	õ
6			&	6	F	V	f	v	†	-	¦	¶	Æ	Ö	æ	ö
7			’	7	G	W	g	w	‡	–	§	·	Ç	×	ç	÷
8			(	8	H	X	h	x	^	~	¨	¸	È	Ø	è	ø
9			)	9	I	Y	i	y	‰	™	©	¹	É	Ù	é	ù
A			*	:	J	Z	j	z	Š	š	ª	º	Ê	Ú	ê	ú
B			+	;	K	[	k	{	<	>	«	»	Ë	Û	ë	û
C			,	<	L	\	l	|	Œ	œ	¬	¼	Ì	Ü	ì	ü
D			-	=	M	]	m	}				½	Í	Ý	í	ý
E			.	>	N	^	n	~			®	¾	Î	Þ	î	þ
F			/	?	O	_	o			Ÿ	¯	¿	Ï	ß	ï	ÿ

PC CHAR SET

1250(PC-WIN LATIN2)

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0				0	@	P	`	p	€			°	Ŕ	Đ	ŕ	đ
1			!	1	A	Q	a	q		‘	ˇ	±	Á	Ń	á	ń
2			"	2	B	R	b	r	,	’	˘	¸	Â	Ň	â	ň
3			#	3	C	S	c	s		“	Ł	ł	Ă	Ó	ă	ó
4			$	4	D	T	d	t	„	”	¤	´	Ä	Ô	ä	ô
5			%	5	E	U	e	u	…	•	Ą	µ	Ĺ	Ő	ĺ	ő
6			&	6	F	V	f	v	†	-	¦	¶	Ć	Ö	ć	ö
7			’	7	G	W	g	w	‡	–	§	·	Ç	×	ç	÷
8			(	8	H	X	h	x			¨	¸	Č	Ř	č	ř
9			)	9	I	Y	i	y	‰	™	©	ą	É	Ů	é	ů
A			*	:	J	Z	j	z	Š	š	Ş	ş	Ę	Ú	ę	ú
B			+	;	K	[	k	{	<	>	«	»	Ë	Ű	ë	ű
C			,	<	L	\	l	|	Ś	ś	¬	Ľ	Ě	Ü	ě	ü
D			–	=	M	]	m	}	Ť	ť	-	˝	Í	Ý	í	ý
E			.	>	N	^	n	~	Ž	ž	®	ľ	Î	Ţ	î	ţ
F			/	?	O	_	o		Ź	ź	Ż	ż	Ď	ß	ď	˙

PC CHAR SET

CHINA

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0				0	@	P	`	p	€	É	á	▒	└	╨	α	≡
1			!	1	A	Q	a	q	ü	æ	í	▓	┴	╤	β	±
2			"	2	B	R	b	r	é	Æ	ó	▓	┬	╥	Γ	≥
3	♥		#	3	C	S	c	s	â	ô	ú	│	├	╙	π	≤
4	◆		¥	4	D	T	d	t	ä	ö	ñ	┤	─	╘	Σ	⌠
5	♣	§	%	5	E	U	e	u	à	ò	Ñ	╡	┼	╒	σ	⌡
6	♠		&	6	F	V	f	v	å	û	ª	╢	╞	╓	µ	÷
7			'	7	G	W	g	w	ç	ù	º	╖	╟	╫	τ	≈
8			(	8	H	X	h	x	ê	ÿ	¿	╕	╚	╪	Φ	°
9			)	9	I	Y	i	y	ë	Ö	⌐	╣	╔	┘	Θ	∙
A			*	:	J	Z	j	z	è	Ü	¬	║	╩	┌	Ω	·
B			+	;	K	[	k	{	ï	¢	½	╗	╦	█	δ	√
C			,	<	L	\	l	|	î	£	¼	╝	╠	▄	∞	n
D			−	=	M	]	m	}	ì	¥	¡	╜	═	▌	ø	²
E			.	>	N	^	n	¯	Ä	₧	«	╛	╬	▐	ε	■
F			/	?	O	_	o		Å	ƒ	»	┐	╧	▀	∩	

PC CHAR SET

CHN2

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0				0	@	P	`	p	€	É	á	▒	└	╨	α	≡
1			!	1	A	Q	a	q	ü	æ	í	▓	┴	╤	β	±
2			"	2	B	R	b	r	é	Æ	ó	▓	┬	╥	Γ	≥
3	♥		#	3	C	S	c	s	â	ô	ú	│	├	╙	π	≤
4	♦		¥	4	D	T	d	t	ä	ö	ñ	┤	─	╘	Σ	⌠
5	♣	§	%	5	E	U	e	u	à	ò	Ñ	╡	┼	╒	σ	⌡
6	♠		&	6	F	V	f	v	å	û	ª	╢	╞	╓	µ	÷
7			'	7	G	W	g	w	ç	ù	º	╖	╟	╫	τ	≈
8			(	8	H	X	h	x	ê	ÿ	¿	╕	╚	╪	Φ	°
9			)	9	I	Y	i	y	ë	Ö	⌐	╣	╔	┘	Θ	∙
A			*	:	J	Z	j	z	è	Ü	¬	║	╩	┌	Ω	·
B			+	;	K	[	k	{	ï	¢	½	╗	╦	█	δ	√
C			,	<	L	\	l	|	î	£	¼	╝	╠	▄	∞	n
D			−	=	M	]	m	}	ì	¥	¡	╜	═	▌	ø	²
E			.	>	N	^	n	~	Ä	₧	«	╛	╬	▐	ε	■
F			/	?	O	_	o		Å	ƒ	»	┐	╧	▀	∩	

PC CHAR SET

990(PC-866-BG)

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0				0	@	P	`	p	А	Р	а	р	└	░	α	≡
1			!	1	A	Q	a	q	Б	С	б	с	┴	▒	ß	±
2			"	2	B	R	b	r	В	Т	в	т	┬	▓	Γ	≥
3	♥		#	3	C	S	c	s	Г	У	г	у	├	│	π	≤
4	◆		$	4	D	T	d	t	Д	Ф	д	ф	─	┤	Σ	⌠
5	♣	§	%	5	E	U	e	u	Е	Х	е	х	┼	№	σ	⌡
6	♠		&	6	F	V	f	v	Ж	Ц	ж	ц	╞	§	µ	÷
7			'	7	G	W	g	w	З	Ч	з	ч	╟	╗	τ	≈
8			(	8	H	X	h	x	И	Ш	и	ш	╚	╝	Φ	°
9			)	9	I	Y	i	y	Й	Щ	й	щ	╔	┘	Θ	∙
A			*	:	J	Z	j	z	К	Ъ	к	ъ	╩	┌	Ω	·
B			+	;	K	[	k	{	Л	Ы	л	ы	╦	█	δ	√
C			,	<	L	\	l	¦	М	Ь	м	ь	╠	▄	∞	n
D			-	=	M	]	m	}	Н	Э	н	э	═	▌	ø	²
E			.	>	N	^	n	~	О	Ю	о	ю	╬	▐	ε	■
F			/	?	O	_	o		П	Я	п	я	┐	▀	∩	

PC CHAR SET

991(PC-GER)

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0				0	§	P	`	p	€	É	á	▒	└	╨	α	≡
1			!	1	A	Q	a	q	ü	æ	í	▓	┴	╤	ß	±
2			"	2	B	R	b	r	é	Æ	ó	▓	┬	╥	Γ	≥
3			#	3	C	S	c	s	â	ô	ú	│	├	╙	π	≤
4			$	4	D	T	d	t	ä	ö	ñ	┤	─	╘	Σ	⌠
5			%	5	E	U	e	u	à	ò	Ñ	╡	┼	╒	σ	⌡
6			&	6	F	V	f	v	å	û	ª	╢	╞	╓	μ	÷
7			'	7	G	W	g	w	ç	ù	º	╖	╟	╫	τ	≈
8			(	8	H	X	h	x	ê	ÿ	¿	╕	╚	╪	Φ	°
9			)	9	I	Y	i	y	ë	Ö	⌐	╣	╔	┘	Θ	∙
A			*	:	J	Z	j	z	è	Ü	¬	║	╩	┌	Ω	·
B			+	;	K	Ä	k	ä	ï	¢	½	╗	╦	▀	δ	√
C			,	<	L	Ö	l	ö	î	£	¼	╝	╠	▄	∞	n
D			−	=	M	Ü	m	ü	ì	¥	¡	╜	═	▌	ø	²
E			.	>	N	^	n	ß	Ä	Pt	«	╛	╬	▐	ε	■
F			/	?	O	_	o		Å	ƒ	»	┐	╧	■	∩	

A.2 ISO Character Sets

ISO CHAR SET

8859/1

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0				0	@	P	`	p				°	À	Ð	à	ð
1			!	1	A	Q	a	q			¡	±	Á	Ñ	á	ñ
2			"	2	B	R	b	r			¢	²	Â	Ò	â	ò
3			#	3	C	S	c	s			£	³	Ã	Ó	ã	ó
4			$	4	D	T	d	t			¤	´	Ä	Ô	ä	ô
5			%	5	E	U	e	u			¥	µ	Å	Õ	å	õ
6			&	6	F	V	f	v			¦	¶	Æ	Ö	æ	ö
7			'	7	G	W	g	w			§	·	Ç	×	ç	÷
8			(	8	H	X	h	x			¨	¸	È	Ø	è	ø
9			)	9	I	Y	i	y			©	¹	É	Ù	é	ù
A			*	:	J	Z	j	z			ª	º	Ê	Ú	ê	ú
B			+	;	K	[	k	{			«	»	Ë	Û	ë	û
C			,	<	L	\	l	|			¬	¼	Ì	Ü	ì	ü
D			-	=	M	]	m	}				½	Í	Ý	í	ý
E			.	>	N	^	n	~			®	¾	Î	Þ	î	þ
F			/	?	O	_	o				¯	¿	Ï	ß	ï	ÿ

ISO CHAR SET

8859/9

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0				0	@	P	`	p				°	À	Ğ	à	ğ
1			!	1	A	Q	a	q			¡	±	Á	Ñ	á	ñ
2			"	2	B	R	b	r			¢	²	Â	Ò	â	ò
3			#	3	C	S	c	s			£	³	Ã	Ó	ã	ó
4			$	4	D	T	d	t			¤	´	Ä	Ô	ä	ô
5			%	5	E	U	e	u			¥	µ	Å	Õ	å	õ
6			&	6	F	V	f	v			¦	¶	Æ	Ö	æ	ö
7			'	7	G	W	g	w			§	·	Ç	×	ç	÷
8			(	8	H	X	h	x			¨	¸	È	Ø	è	ø
9			)	9	I	Y	i	y			©	¹	É	Ù	é	ù
A			*	:	J	Z	j	z			ª	º	Ê	Ú	ê	ú
B			+	;	K	[	k	{			«	»	Ë	Û	ë	û
C			,	<	L	\	l	|			¬	¼	Ì	Ü	ì	ü
D			-	=	M	]	m	}				½	Í	İ	í	ı
E			.	>	N	^	n	~			®	¾	Î	Ş	î	ş
F			/	?	O	_	o				¯	¿	Ï	ß	ï	ÿ

ISO CHAR SET

8859/2

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0				0	@	P	`	p				°	Ŕ	Đ	ŕ	đ
1			!	1	A	Q	a	q			Ą	ą	Á	Ń	á	ń
2			"	2	B	R	b	r			˘	˛	Â	Ň	â	ň
3			#	3	C	S	c	s			Ł	ł	Ă	Ó	ă	ó
4			$	4	D	T	d	t			¤	´	Ä	Ô	ä	ô
5			%	5	E	U	e	u			Ľ	ľ	Ĺ	Ő	ĺ	ő
6			&	6	F	V	f	v			Ś	ś	Ć	Ö	ć	ö
7			'	7	G	W	g	w			§	ˇ	Ç	×	ç	÷
8			(	8	H	X	h	x			¨	¸	Č	Ř	č	ř
9			)	9	I	Y	i	y			Š	š	É	Ů	é	ů
A			*	:	J	Z	j	z			Ş	ş	Ę	Ú	ę	ú
B			+	;	K	[	k	{			Ť	ť	Ë	Ű	ë	ű
C			,	<	L	\	l	|			Ź	ź	Ě	Ü	ě	ü
D			-	=	M	]	m	}			-	˝	Í	Ý	í	ý
E			.	>	N	^	n	~			Ž	ž	Î	Ţ	î	ţ
F			/	?	O	_	o				Ż	ż	Ď	ß	ď	˙

ISO CHAR SET

8859/5

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0				0	@	P	`	p				А	Р	а	р	№
1			!	1	A	Q	a	q			Ё	Б	С	б	с	ё
2			"	2	B	R	b	r			Ђ	В	Т	в	т	ђ
3			#	3	C	S	c	s			Ѓ	Г	У	г	у	ѓ
4			$	4	D	T	d	t			Є	Д	Ф	д	ф	є
5			%	5	E	U	e	u			S	Е	Х	е	х	s
6			&	6	F	V	f	v			І	Ж	Ц	ж	ц	і
7			'	7	G	W	g	w			Ї	З	Ч	з	ч	ї
8			(	8	H	X	h	x			J	И	Ш	и	ш	j
9			)	9	I	Y	i	y			Љ	Й	Щ	й	щ	љ
A			*	:	J	Z	j	z			Њ	К	Ъ	к	ъ	њ
B			+	;	K	[	k	{			Ћ	Л	Ы	л	ы	ћ
C			,	<	L	\	l	|		Ќ	М	Ь	м	ь	ќ
D			-	=	M	]	m	}			-	Н	Э	н	э	§
E			.	>	N	^	n	~			Ў	О	Ю	о	ю	ў
F			/	?	O	_	o				Џ	П	Я	п	я	џ

ISO CHAR SET

8859/15

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0				0	@	P	`	p				°	À	Ð	à	ð
1			!	1	A	Q	a	q			¡	±	Á	Ñ	á	ñ
2			"	2	B	R	b	r			¢	²	Â	Ò	â	ò
3			#	3	C	S	c	s			£	³	Ã	Ó	ã	ó
4			$	4	D	T	d	t			€	Ž	Ä	Ô	ä	ô
5			%	5	E	U	e	u			¥	µ	Å	Õ	å	õ
6			&	6	F	V	f	v			Š	¶	Æ	Ö	æ	ö
7			'	7	G	W	g	w			§	·	Ç	×	ç	÷
8			(	8	H	X	h	x			š	ž	È	Ø	è	ø
9			)	9	I	Y	i	y			©	¹	É	Ù	é	ù
A			*	:	J	Z	j	z			ª	º	Ê	Ú	ê	ú
B			+	;	K	[	k	{			«	»	Ë	Û	ë	û
C			,	<	L	\	l	|			¬	Œ	Ì	Ü	ì	ü
D			-	=	M	]	m	}			-	œ	Í	Ý	í	ý
E			.	>	N	^	n	~			®	Ÿ	Î	Þ	î	þ
F			/	?	O	_	o				¯	¿	Ï	ß	ï	ÿ

ISO CHAR SET

8859/6

	◆	١	٢	٣	٤	٥	٦	٧	٨	٩	A	B	C	D	E	F
◆			◆	@	P	`	p							ذ	ـ	ً
١		!	١	A	Q	a	q						ء	ر	ف	ٌ
٢		"	٢	B	R	b	r						آ	ز	ق	ٍ
٣		#	٣	C	S	c	s						أ	س	ك	
٤		$	٤	D	T	d	t				¤		ؤ	ش	ل	
٥		%	٥	E	U	e	u						إ	ص	م	
٦		&	٦	F	V	f	v						ئ	ض	ن	
٧		'	٧	G	W	g	w						ا	ط	ه	
٨		(	٨	H	X	h	x						ب	ظ	و	
٩		)	٩	I	Y	i	y						ة	ع	ى	
A		*	:	J	Z	j	z						ت	غ	ي	
B		+	;	K	[	k	{					؛	ث		ً	
C		,	<	L	\	l	|				،		ج		ٌ	
D		-	=	M	]	m	}				-		ح		ٍ	
E		.	>	N	^	n	~						خ		ْ	
F		/	?	O	_	o						؟	د		ّ	

ISO CHAR SET

8859/7

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0				0	@	P	`	p				°	ΐ	Π	ΰ	π
1			!	1	A	Q	a	q			‘	±	A	P	α	ρ
2			"	2	B	R	b	r			’	²	B		β	ς
3			#	3	C	S	c	s			£	³	Γ	Σ	γ	σ
4			$	4	D	T	d	t				΄	Δ	T	δ	τ
5			%	5	E	U	e	u				΅	E	Y	ε	υ
6			&	6	F	V	f	v			¦	Ά	Z	Φ	ζ	φ
7			’	7	G	W	g	w			§	·	H	X	η	χ
8			(	8	H	X	h	x			¨	Έ	Θ	Ψ	θ	ψ
9			)	9	I	Y	i	y			©	Ή	I	Ω	ι	ω
A			*	:	J	Z	j	z				Ί	K	Ϊ	κ	ϊ
B			+	;	K	[	k	{			«	»	Λ	Ÿ	λ	ü
C			,	<	L	\	l	|			¬	Ό	M	ά	μ	ό
D			-	=	M	]	m	}			-	½	N	έ	ν	ύ
E			.	>	N	^	n	~				Ύ	Ξ	ή	ξ	ώ
F			/	?	O	_	o				―	Ώ	O	ί	o	

ISO CHAR SET

8859/8

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0				0	@	P	`	p				°			א	]
1			!	1	A	Q	a	q				±			ב	ד
2			"	2	B	R	b	r			¢	²			ג	ה
3			#	3	C	S	c	s			£	³			ד	ו
4			$	4	D	T	d	t			¤	´			ה	ז
5			%	5	E	U	e	u			¥	µ			ו	ח
6			&	6	F	V	f	v			¦	¶			ז	ט
7			'	7	G	W	g	w			§	·			ח	י
8			(	8	H	X	h	x			¨	¸			ט	ך
9			)	9	I	Y	i	y			©	¹			י	ש
A			*	:	J	Z	j	z			×	÷			ך	ת
B			+	;	K	[	k	{			«	»			כ	
C			,	<	L	\	l	|			¬	¼			ל	
D			-	=	M	]	m	}			-	½			ם	
E			.	>	N	^	n	~			®	¾			מ	
F			/	?	O	_	o				¯			=	ן	

ISO CHAR SET

CPOLUNIX

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0				0	@	P	`	p				°	À	L·	à	l·
1			!	1	A	Q	a	q			¡	±	Á	Ñ	á	ñ
2			"	2	B	R	b	r			¢	²	Â	Ò	â	ò
3			#	3	C	S	c	s			£	³	Ã	Ó	ã	ó
4			$	4	D	T	d	t				´	Ä	Ô	ä	ô
5			%	5	E	U	e	u			¥	µ	Å	Õ	å	õ
6			&	6	F	V	f	v				¶	Æ	Ö	æ	ö
7			'	7	G	W	g	w			§	·	Ç	Œ	ç	œ
8			(	8	H	X	h	x			¤		È	Ø	è	ø
9			)	9	I	Y	i	y			©	¹	É	Ù	é	ù
A			*	:	J	Z	j	z			ª	º	Ê	Ú	ê	ú
B			+	;	K	[	k	{			«	»	Ë	Û	ë	û
C			,	<	L	\	l	|			¬	¼	Ì	Ü	ì	ü
D			-	=	M	]	m	}				½	Í	Ý	í	ÿ
E			.	>	N	^	n	~				¾	Î	Pts	î	
F			/	?	O	_	o					¿	Ï	ß	ï	

A.3 OCR-A Character Sets

OCR-A

ST15INI

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0																
1																
2			"													
3			£													
4			$													
5			%													
6			&													
7			'													
8			(													
9			)													
A			*													
B			+													
C			,													
D			-													
E			.													
F			/													

OCR-A

ST15DK/N

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0			0		P											€
1			1		A		Q									
2		"	2		B		R									
3		£	3		C		S									
4		$	4		D		T									
5		%	5		E		U									
6		&	6		F		V									
7		'	7		G		W									
8		(	8		H		X									
9		)	9		I		Y									
A		*	:		J		Z									
B		+	;		K											
C		,	<		L											
D		-	=		M											
E		.	>		N											
F		/	?		O											

A.4 OCR-B Character Sets

OCR-B

ST15INI

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0				0	@	P	`	p	€							
1		!	1	A	Q	a	q									
2		"	2	B	R	b	r									
3		#	3	C	S	c	s									
4		¤	4	D	T	d	t									
5		%	5	E	U	e	u									
6		&	6	F	V	f	v									
7		'	7	G	W	g	w									
8		(	8	H	X	h	x									
9		)	9	I	Y	i	y									
A		*	:	J	Z	j	z									
B		+	;	K	[	k	{									
C		,	<	L	\	l	|								
D		-	=	M	]	m	}									
E		.	>	N	^	n	¯									
F		/	?	O	_	o										

OCR-B

ST15DK/N

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0				0	'	P	`	p	€							
1		!	1	A	Q	a	q									
2		"	2	B	R	b	r									
3		£	3	C	S	c	s									
4		$	4	D	T	d	t									
5		%	5	E	U	e	u									
6		&	6	F	V	f	v									
7		'	7	G	W	g	w									
8		(	8	H	X	h	x									
9		)	9	I	Y	i	y									
A		*	:	J	Z	j	z									
B		+	;	K	Æ	k	æ									
C		,	<	L	Ø	l	ø									
D		-	=	M	Å	m	å									
E		.	>	N	^	n	¨									
F		/	?	O	_	o										

Appendix B IBM ProPrinter X24 and IBM ProPrinter II Commands

Characters used in control functions appear in monospaced type. The table below explains some of the conventions used.

A pair of numbers separated by a slash (/) character indicates Column/Row notation. This notation refers to the location of a character in a standard code table, such as ASCII. (example: 1/B = 1B is the hex-code for Escape)

Spaces appear between characters in sequence for clarity; they are not part of the format.

At the begin of this chapter you will find a listing of the IBM ProPrinter Emulation commands classified by Hex Code and at the end a Hex - Decimal conversion table.

The following conventions are used in the command listings:

Conventions:	
ESC	Escape (1/B), introduces an escape sequence
P*n*	Numeric parameter, or number of units that specify a distance or quantity pertaining to the escape sequence, control function or control string. Accepted values are 0...9999, may be preceded by + or -. If the parameter is in normal notation like "200" the programming in hex-code is according to a ASCII table. ("200" = 32,30,30 in hex).
n1..n2..n3....nn	A series of parameters pertaining to the escape sequence, control function or control string.
SP	Is standing for Space (hex 20).

Note: Some commands or parameter may be different for a specific **Printer type**. In that case it will be indicated by the **Printer name** to which printer a command or parameter applies.

B.1 Command Index

This table shows the IBM ProPrinter X24 and IBM ProPrinter II Emulation commands classified by Hex Code.

Mnemonic	Hex Code	Function
BS	08	Backspace
HT	09	Horizontal tabulation
LF	0A	Line feed forward
VT	0B	Vertical tabulation
FF	0C	Form feed
CR	0D	Carriage return
SO	0E	Double width (one line)
SI	0F	16.6/17.1 cpi (Condensed)
DC1	11	Activate printer - system connection (select printer)
DC2	12	10 cpi (Pica)
DC3	13	Deactivate printer-system connection
DC4	14	Cancel double width (one line)
CAN	18	Clear print buffer
ESC BEL E	1B 07 45 ...	Change Emulation
ESC * ...AGM	1B 2A ...	Select Alternate Graphics Mode AGM
ESC -	1B 2D ...	Underline
ESC 0	1B 30	Line feed = 1/8"
ESC 1	1B 31	Line feed = 7/72"
ESC 2	1B 32	Line feed = 1/6" or Activate ESC A n
ESC 3 ...	1B 33 ...	Line feed = n/216"
ESC 4	1B 34	Top of form
ESC 5	1B 35 ...	Automatic line feed after CR
ESC 6	1B 36	Table 2 of character set
ESC 7	1B 37	Table 1 of character set
ESC :	1B 3A	12 cpi (Elite)
ESC =...	1B 3D ...	Customized characters (DLL)
ESC A ...	1B 41 ...	Line feed = n/72"
ESC B	1B 42 ...	Vertical tabulation program
ESC C ..	1B 43 ...	Form length as no. lines
ESC C NUL ...	1B 43 00 ...	Form length in inches

Mnemonic	Hex Code	Function
ESC D	1B 44 ...	Horizontal tabulation program
ESC E	1B 45	Bold face
ESC F	1B 46	Cancel bold face
ESC G	1B 47	Double-pass printing
ESC H	1B 48	Cancel double-pass printing
ESC I ...	1B 49 ...	Select print mode
ESC J ...	1B 4A ...	One n/216" line feed (for graphics)
ESC K ...	1B 4B ...	normal resolution BIM
ESC L...	1B 4B ...	double resolution BIM
ESC N ...	1B 4E ...	Bottom of form
ESC O	1B 4F	Cancel bottom of form
ESC P ...	1B 50 ...	Proportional spacing
ESC Q ETX	1B 51 03	Deactivate printer-system connection
ESC R	1B 52	Cancel tabulation stop
ESC S ...	1B 53 ...	Superscript/subscript
ESC T	1B 54	Cancel superscript/subscript
ESC U ...	1B 55 ...	Uni/bidirectional printing
ESC W ...	1B 57 ...	Double width (continued)
ESC X...	1B 58 ...	Left and right margins
ESC Y ...	1B 59 ...	Double resolution BIM
ESC Z ...	1B 5A ...	Quadruple resolution BIM
ESC [@ ...	1B 5B 40 ...	Double height/width
ESC [A ...	1B 5B 41 ...	Triple height/width
ESC [g ...	1B 5B 67 ...	High Resolution Graphics
**ESC **	1B 5C ...	Print characters from table 3
ESC]	1B 5D	Line feed backward
ESC ^	1B 5E	Print a character from table 3
ESC _	1B 5F ...	Over line
ESC d ...	1B 64	Relative Forward Horizontal Movement
FS S ...	1C 53 ...	Adjust characters space

B.2 Command Description (by function)

When you select the ***EMULATION: IBM Proprinter X24*** or IBM ***ProPrinter II*** parameter in the setup, the machine interprets all the commands of the IBM ProPrinter X24 and IBM ProPrinter II printer, grouped according to their codes, as follows:

- **Basic Operations**
- **Margins**
- **Line Feed**
- **Print Pitches**
- **Print Attributes**
- **Tabulation**
- **Graphics**
- **Down Line Loading of Customized Characters (DLL)**
- **Other Functions**

B.2.1 Basic Operations

Before printing, the printer stores the image of a line in the print buffer. All the commands concerning this section result in immediate printing of the buffer contents.

- **BS** : Backspace
- **CR** : Carriage return
- **FF** : Form feed
- **HT** : Horizontal tabulation
- **LF** : Line feed
- **VT** : Vertical tabulation

BS

Backspace Hexadecimal code : 08

Moves the print head back one print pitch of the selected value.

Special features:
- by two steps, if double width has been selected
- ignored if the current position is the start of the line
- a fixed step (10 cpi), if proportional spacing has been selected

CR

Carriage Return Hexadecimal code: 0D

Prints the current line and sets the printing position at the left margin.

Also causes a line feed, if the parameter ***CR + LF = YES*** has been selected during the setup or if **ESC 5 1** is transmitted from host.

FF

Form Feed Hexadecimal code: 0C

Prints the current line and advances the document to the next page. If the length of form is not long enough, ejects the form from the front feeder.

If the parameter ***LF + CR = YES*** has been selected from the Setup, the printing position is set at the left margin.

HT

Horizontal Tabulation Hexadecimal code : 09

Advances the print head to the next horizontal tabulation stop (defined using **ESC D**).
The default setting is one stop every 8 characters, beginning at position 9.
If the position of the next stop is beyond the right margin, the printer ignores the command.

LF

Line Feed Forward Hexadecimal code: 0A

Prints the current line and executes a line feed of a value determined by the vertical spacing selected.

If the parameter ***LF + CR = YES*** has been selected from the Setup, the printing position is set at the left margin.

VT

Vertical Tabulation Hexadecimal code: 0B

Moves the print head to the next vertical tabulation stop (set using **ESC B**).
If there is no vertical tabulation program or if the next tabulation stop lies outside the predefined printing area, it executes a line feed only.

If the parameter ***LF + CR = YES*** has been set in the **SETUP**, a carriage return is also executed.

B.2.2 Margins

- **ESC 4** : Top of form
- **ESC C *n*** : Form length as no. of lines
- **ESC C NUL *n*** : Form length in inches
- **ESC N *n*** : Bottom of form
- **ESC O** : Cancel bottom of form
- **ESC X *n1 n2*** : Left and right margins

ESC 4

Top of Form Hexadecimal code: 1B 34

Sets the first line of the form in the current position. It does not change the current form length.

ESC C *n*

Form Length in No. of Lines Hexadecimal code: 1B 43 *n*

n = 1 - 255

Defines the form length as a number of print lines. The space occupied depends on the value of the current line feed. This space remains unchanged, even if the line feed is changed, until the printer is switched off or a new form length command is received.

Resets the line counter and fixes the current position as the start of the page (top of form).

ESC C NUL *n*

Form Length in Inches Hexadecimal code: 1B 43 00 *n*

n = 1 - 30

Defines the form length directly in inches (30 max). One inch is equal to 25.4 mm. It resets the line counter and sets the top of form at the current position.

ESC N *n*

Bottom of Form Hexadecimal code: 1B 4E *n*

n = 0 - 255

Defines the number of line feeds (of the current value) not to be printed (to be skipped) between the end of the current page and the start of the next (bottom margin + top of form).
This setting is cancelled by **ESC O** and **ESC C *n***.

ESC O

Reset Bottom of Form Hexadecimal code: 1B 4F

Cancels the bottom of form.

ESC X *n1 n2*

Left and Right Margins Hexadecimal code: 1B 58 *n1 n2*

n1, n2 = 1 - 255

Parameter *n1* indicates the number of the column, in the current print pitch, for the left margin.
Parameter *n2* indicates the number of the column, in the current print pitch, for the right margin.
Value *n2* - *n1* **must** be more than 1. Values that go beyond the right edge of the paper are set back to the right margin.

When parameters *n1* and/or *n2* are set to 0, they indicate that the current margins remain valid.
The margins are set according to the current print pitch, but their absolute position does not change, even if the pitch is then changed.

B.2.3 Line feed

- **ESC 0** : Line feed = 1/8"
- **ESC 1** : Line feed = 7/72"
- **ESC 2** : Line feed = 1/6" or Activate ESC A n
- **ESC 3 *n*** : Line feed = n/216" or n/180" (ProPrinter X24); n/216" (ProPrinter II)
- **ESC A *n*** : Line feed = n/72" or n/60 (ProPrinter X24); n/72" (ProPrinter II)
- **ESC J *n*** : One line feed of n/216" or n/180 (ProPrinter X24); n/216" (ProPrinter II)
- **ESC]** : Line feed backward
- **ESC [\ *c1 c2 t1 t2 n1 n2***: Line feed Value Modification (**ProPrinter X24**)

ESC 0

Line Feed - 1/8" Hexadecimal code: 1B 30

Sets the 1/8" (3.175 mm) line feed.
Remains valid until a new line feed command is received.

ESC 1

Line Feed - 7/72" Hexadecimal code: 1B 31

Sets the 7/72" (2,47 mm) line feed.
It remains valid until a new line feed command is received.

ESC 2

Line Feed = 1/6" or Activate ESC A *n* Hexadecimal code: 1B 32

Sets the line feed of the value according to **ESC A *n***, when it is followed by this command. It remains valid until a new line feed command is received.

Line feed - 1/6":
Sent alone, it sets the 1/6" (4,23 mm) line feed. This is the line feed recommended for alphanumeric texts and ensures that semi graphic characters meet perfectly.

ESC 3 *n* **(IBM ProPrinter X24)**

Line Feed - n/216" or n/180 Hexadecimal code: 1B 33 *n*

n = 1 - 255

If the parameter ***AGM : NO*** has been selected in the SETUP ,it sets the n/216" (0,1176 x n mm) line feed; If the parameter ***AGM : YES*** has been selected in the SETUP ,it sets the n/180" (0,141 x n mm) line feed.
This is the line feed recommended for graphic printing (BIM). If programmed to 24/216", it ensures that the various lines in 8-needle graphic printing meet perfectly.
It remains valid until a new line feed command is received.
To obtain precise line feeds, always use multiples of 3 for parameter ***n***.

ESC 3 *n* (IBM ProPrinter II)

Line Feed - n/216" Hexadecimal code: 1B 33 *n*

n = 1 - 255

Sets the n/216" (0,1176 x *n* mm) line feed.
This is the line feed recommended for graphic printing (BIM). If programmed to 24/216", it ensures that the various lines in 8-needle graphic printing meet perfectly.

It remains valid until a new line feed command is received.

Note: **To obtain precise line feeds, always use multiples of 3 for parameter *n*.**

ESC A *n* (IBM ProPrinter X24)

Line Feed - n/72" or n/60" Hexadecimal code: 1B 41 *n*

n = 1 - 85

If the parameter ***AGM : NO*** has been selected in the SETUP,it sets the n/72" (0,3528 x n mm) line feed; If the parameter ***AGM : YES*** has been selected in the SETUP ,it sets the n/60" (0,432 x n mm) line feed.

It will only be executed when the command **ESC 2** is received. Until then, the current line feed remains valid.

Note: *n* = 0 does not change the current line feed.

ESC A *n* (IBM ProPrinter II)

Line Feed - n/72" Hexadecimal code: 1B 41 *n*

n = 1 - 85

Sets the n/72" (0,3528 x *n* mm) line feed.
It will only be executed when the command **ESC 2** is received. Until then, the current line feed remains valid.

Note: *n* = 0 does not change the current line feed.

ESC J *n* **(IBM ProPrinter X24)**

One Line Feed of n/216" or n/180" Hexadecimal code: 1B 4A *n*

n = 1 - 255

Prints the buffer and feeds the paper line feed.If the parameter ***AGM : NO*** has been selected in the SETUP , the paper line feed by n/216"; If the parameter ***AGM : YES*** has been selected in the SETUP , the paper line feed by n/180".

It also executes a carriage return, if the parameter ***LF + CR : YES*** has been selected in the SETUP.

The value of ***n*** must be a multiple of 3 (minimum line feed). In 8-needle graphic printing, the value 24/216" ensures that the lines meet perfectly.

ESC J *n* **(IBM ProPrinter II)**

One Line Feed of n/216" Hexadecimal code: 1B 4A *n*

n = 1 - 255

Prints the buffer and feeds the paper by n/216". It also executes a carriage return, if the parameter **LF + CR = YES** has been selected in the **SETUP**.

In 8-needle graphic printing, the value 24/216" ensures that the lines meet perfectly.

ESC]

Line Feed Backward Hexadecimal code: 1B 5D

Prints the current line and executes a line feed backward of a value determined by the vertical spacing selected.

If the parameter **LF + CR = YES** has been selected from the Setup, the printing position is set at the left margin.

ESC [*c1 c2 t1 t2 n1 n2* **IBM ProPrinter X24 only**

Line Feed Value Modification Hexadecimal code: 1B 5B 5C *c1 t2 n1 n2*

Modifies the values of codes ESC J and ESC 2 as n/ 216” or n/180”.

Parameters *c1, c2, t1, t2* and *n1* have the following fixed decimal values: 4, 0, 0, 0, and 0. Parameter *n2* has the decimal value: 180 or 216.

B.2.4 Print Pitches

- **DC2** : 10 cpi (Pica)
- **ESC :** : 12 cpi (Elite)
- **ESC P *n***: Proportional spacing
- **FS S *n1 n2*** : Adjust characters space
- **SI**: 16.6/17.1 cpi

DC2

10 cpi (Pica) Hexadecimal code: 12

Cancels the print pitches set using **SI** and **ESC :**, restoring 10 cpi. It does not cancel Double width.

ESC :

12 cpi (Elite) Hexadecimal code: 1B 3A

Sets 12 characters per inch starting from the current position.
Cancelled by **DC2**, which restores 10 cpi (Pica).

ESC P *n*

Proportional Spacing Hexadecimal code: 1B 50 *n*

Selects printing with proportional spacing.

In this way, the print pitch changes from one character to another, according to their width. Proportional spacing is canceled by any command that changes the print pitch.
Parameter *n* may be set to the following values:

n = 1 (1 or 49)D : sets proportional spacing
n = 0 (0 or 48)D : cancels proportional spacing

Note: Takes priority over a different setting made on the operator console.

FS S *n*1 *n*2

Adjust characters space Hexadecimal code: 1B 50 *n1 n2*

n1n2 = 00 - 23

The command adjust the characters space to the current characters pitch starting from the current position.

If the *n1n2* value is equal to 00, the character width is not change. If *n1n2* > 23 the value of *n1n2* is set to 23.
It sets the characters width be (1+ *n1n2*/24)/(current CPI value) inch.

SI

16.6 / 17.1 cpi (Condensed) Hexadecimal code: 0F

If the parameter **COMPRESS : 17.1** has been selected in the setup, it sets 17.1 characters per inch starting from the current position.
If the parameter **COMPRESS : 16.6** has been selected in the setup, it sets 16.6 characters per inch starting from the current position.

Cancelled by **DC2**, which restores 10 cpi (Pica).

B.2.5 Print Attributes

- **DC4** : Cancel double width (one line)
- **ESC E** : Bold face
- **ESC F** : Cancel bold face
- **ESC G** : Double-pass printing
- **ESC H** : Cancel double-pass printing
- **ESC I *n*** : Select print mode
- **ESC S *n*** : Superscript/subscript
- **ESC T** : Cancel superscript/subscript
- **ESC U *n*** : Uni/bidirectional printing
- **ESC W *n*** : Double width (continuous)
- **ESC - *n*** : Underline
- **ESC _ *n*** : Overline
- **SO** : Double width (one line)
- **ESC [@** : Double height/width
- **ESC [A ...** : Triple height/width

DC4

Cancel Double Width (One Line) Hexadecimal code: 14

Cancels double width set by **SO** and restores the previous print pitch.

ESC E

Bold Face Hexadecimal code: 1B 45

Sets bold face printing until the **ESC F** command, which cancels it, is received.
Bold face is obtained by the printer in one pass only.

ESC F

Cancel Bold Face Hexadecimal code: 1B 46

Cancels bold face printing set by **ESC E**.

ESC G

Double-Pass Printing Hexadecimal code: 1B 47

Prints the current font in double pass.

ESC H

Cancel Double-Pass Printing Hexadecimal code: 1B 48

Cancels printing selected by **ESC G**.

ESC I *n* **(IBM ProPrinter X24)**

Select Print Mode Hexadecimal code: 1B 49 *n*

Selects the print mode and character set, according to the decimal value of parameter *n*:

n	**Print Mode**
0	Draft 10 cpi sans-serif (standard)
8	Draft 12 cpi (derived from Draft 10 cpi)
16	Draft 17 cpi (derived from Draft 10 cpi)
2	Letter 10 cpi Courier
10	Letter 12 cpi Prestrige Elite
18	Letter 17 cpi Courier
3	Letter Proportional
4	Draft 10 cpi downloaded
12	Draft 12 cpi downloaded (derived from Draft 10 cpi downloaded)
20	Draft 17 cpi downloaded (derived from Draft 10 cpi downloaded)
6	Letter 10 cpi downloaded
14	Letter 12 cpi downloaded
22	Letter 17 cpi downloaded (derived from Letter 10 cpi downloaded)
7	Letter Proportional downloaded

ESC I *n* **(IBM ProPrinter II)**

Select Print Mode Hexadecimal code: 1B 49 *n*

Selects the print mode and character set, according to the decimal value of parameter *n*:

n	**Print Mode**
0	Draft with standard character set
1	12 cpi Fast Font with standard character set
2	SANS SERIF with standard character set
3	ROMAN with standard character set
4	Draft with DRAFT DLL character set
5	Fast Font with DRAFT DLL character set
6	SANS SERIF with DRAFT DLL character set
7	ROMAN with NLQ character set

ESC S *n*

Superscript/Subscript Hexadecimal code: 1B 53 *n*

Sets the printing of small characters in the current pitch. It is obtained by a single printing pass.

Superscript is printed using the top five needles of the print head and subscript with the bottom five needles of the normal character matrix. Both settings are canceled by **ESC T**.

n = 0 (0 or 48)D: superscript
n = 1 (1 or 49)D: subscript

ESC T

Cancel Superscript/Subscript Hexadecimal code: 1B 54

Cancels the two settings obtained by **ESC S *n***.

ESC U *n*

Uni/Bidirectional Printing Hexadecimal code: 1B 55 *n*

Sets continued uni or bidirectional printing. Parameter n may be set to:

n = 0 (0 o 48)D : bidirectional
n = 1 (1 o 49)D : unidirectional

ESC W *n*

Double Width (continued) Hexadecimal code: 1B 57 *n*

Sets/cancels double width.
Parameter *n* sets/cancels double width (the width of the characters is doubled with respect to the preselected print pitch and, as a result, the capacity of the print lines is divided by two).

n = 1 (1 or 49)D: sets
n = 0 (0 or 48)D: cancels

ESC - *n*

Underline Hexadecimal code: 1B 2D *n*

Activate/deactivate underline.
n = 1 (1 or 49)D: activate
n = 0 (0 or 48)D: deactivate

Underline also the SPACE character, but not horizontal tabulations. Semigraphic characters cannot be underlined.

ESC _ *n*

Overline Hexadecimal code: 1B 5F *n*

Activate/deactivate overline.

The overline is obtained using the first needle (with characters that use the first needle, part of the overline merges with the "crest" of the characters).

n = 1 (1 or 49)D: activate
n = 0 (0 or 48)D: deactivate

Overline also the SPACE character, but not horizontal tabulations. Semigraphic characters cannot be overlined.

SO

Double Width (One Line) Hexadecimal code: 0E

Prints each character doubling the preset width and, as a result, the number of characters per inch is divided by two.

The **BS** command will move the print head back by a double space.

Valid for one line only. Canceled by **DC4**, **CR**, **LF**, **FF**, **VT**, **ESC W NU**, **ESC J**, **ESC [@ ..** and **CAN**.

ESC [@ *n1 n2 m1 m2 m3 m4*

Double Height/Width Hexadecimal code: 1B 5B 40 04 00 00 00 *m3 m4*

Sets double height and / or double width for the characters printed, with or without changing the line feed.

Parameters *n1* and *n2* indicate the number of bytes that follow and have the following fixed values: (4)D and (0)D respectively.

These two parameters are followed by four bytes (from ***m1*** to ***m4***) which have the following values:
Parameters *m1* and *m2* have a fixed value: (0)D.

Parameter *m3* defines the height of the characters and the line feed according to the decimal values in the table below:

m3	**Line feed and height of characters**
0	No change with respect to the current settings
1	Unchanged line feed, normal height
2	Unchanged line feed, double height
16	Single line feed, unchanged height
17	Single line feed, normal height
18	Single line feed, double height
32	Double line feed, unchanged height
33	Double line feed, normal height
34	Double line feed, double height

The top half of the byte indicates the line feed (unchanged, single or double); the bottom half of the byte indicates the height of the characters.

Parameter *m4* defines the width of the characters according to the decimal values in the table below:

m4	**Width of characters**
0	Unchanged width
1	Normal width
2	Double width

The top half of the byte is ignored, while the values of the bottom half of the byte are significant.

ESC [A *n1 n2 m1 m2 m3 m4*

Triple Height/Width Hexadecimal code: 1B 5B 41 04 00 00 00 *m3 m4*

Sets triple height and/or double width for the characters printed, with or without changing the line feed.

Parameters *n1* and *n2* indicate the number of bytes that follow and have the following fixed values: (4)D and (0)D respectively.

These two parameters are followed by four bytes (from ***m1*** to ***m4***) which have the following values:
Parameters *m1* and *m2* have a fixed value: (0)D.

Parameter *m3* defines the height of the characters and the line feed according to the decimal values in the table below:

m3	**Line feed and height of characters**
0	No change with respect to the current settings
1	Unchanged line feed, normal height
2	Unchanged line feed, triple height
16	Single line feed, unchanged height
17	Single line feed, normal height
18	Single line feed, triple height
32	Double line feed, unchanged height
33	Double line feed, normal height
34	Double line feed, triple height
48	Triple line feed, unchanged height
49	Triple line feed, normal height
50	Triple line feed, triple height

The top half of the byte indicates the line feed (unchanged, single, double, or triple); the bottom half of the byte indicates the height of the characters.

Parameter *m4* defines the width of the characters according to the decimal values in the table below:

m4	**Width of characters**
0	Unchanged width
1	Normal width
2	Double width
3	Triple width

The top half of the byte is ignored, while the values of the bottom half of the byte are significant.

B.2.6 Tabulation

- **ESC B ...** : Vertical tabulation program
- **ESC D** ... : Horizontal tabulation program
- **ESC d ...** : Relative Forward Horizontal Movement
- **ESC R** : Cancel tabulation stops

ESC B *n1..n254 k1..k64* NUL

Vertical Tabulation Program Hexadecimal code: 1B 42 *n1..n254 k1..k64* 00

n = 1 - 254
k = 1 - 64

The values of parameters ***n*** indicate the lines on which the tabulation stops will be positioned (the top of form is 1). The line feed applied is the current one.

Parameter ***k*** defines a vertical tabulation program with a maximum of 64 stops.

At power-on, there are no vertical tabulation stops. The sequence **ESC B NUL**, and the command **ESC R**, clear all vertical tabulation stops.

When a vertical tabulation program is executed, all the current vertical tabulation stops are cleared. If there is no vertical tabulation program, the command VT executes a single line feed.

ESC D *n1 .. n255 k1.. k28* NUL

Horizontal Tabulation Program Hexadecimal code: 1B 44 *n1..n255 k1..k28* 00

n = 1 - 255
k = 1 - 28

The values of the parameters ***n*** indicate the columns in which the tabulation stops will be positioned (the left edge is column 1). The print pitch applied is the current one. At power-on, the default setting is one tab stop every 8 characters, starting from column 9.

Parameter ***k*** defines a horizontal tabulation program with a maximum of 28 stops.

The sequence **ESC D NUL** clears all horizontal tabulation stops.
The command **ESC R** clears all the tabulation stops and restores the default condition.

ESC d *n1 n2*

Relative Forward Horizontal Movement Hexadecimal code: 1B 64 *n1 n2*

where *n1* = 00 - FF
n2 = 00 - FF

Moves the current horizontal position to the right at a distance specified in the *n1* and *n2* parameters.

The distance is computed from the parameters using :
distance = (*n2* * 256) + *n1*

The distance is specified in dot units using 1/120 inch as horizontal resolution.
Spaces produced by this command are affected by underscore, overscore, and strikethrough. If it goes beyond the right margin, current horizontal position is set to the right margin.

ESC R

Clear All Tabulation Stops Hexadecimal code: 1B 52

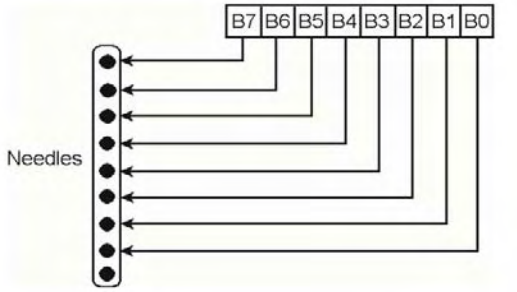
Deletes all the horizontal tabulation stops set by **ESC D ..** and all vertical tabulation stops set by **ESC B ...**

For the horizontal tabulation stops, the default condition is restored:
one stop every 8 characters.

B.2.7 Graphics

The printer can operate in Bit Image Mode (bit map printing), to create illustrations and diagrams. In this way, the image is created by printing each byte received as a vertical line of 8 dots. A dot is printed for each bit set to "1" in the byte sent.

The least significant bit corresponds to the lowest dot on the line, while the most significant bit corresponds to the highest dot.



The graphic print commands only apply to one print line. The line end command **CR/LF** is only recognized when the printer leaves graphic printing to return to alphanumeric printing. As a result the number of bytes that can follow a command for graphics is limited by the maximum capacity of a print line (and the graphic resolution). The data that exceeds the capacity of the line buffer is ignored.

The graphic commands must therefore be repeated for each print line if you want to print an image consisting of several lines.

One line can contain both alphanumeric and graphical characters. To calculate the space that the alphanumeric characters occupy inside the graphics, a table is provided later on.

BIM Data/Capacity of the print line with various resolutions

BIM Resolution	**80 columns**
Normal (ESC K)	480
Double (ESC L, ESC Y)	960
Quadruple (ESC Z)	1920

Space occupied by characters inside BIM data

The table below shows the relationship between the space occupied (as a number of bytes) by a normal character inside a mixed print line (text + graphics).

BIM resolution:	**Normal**	**Double**	**Quadruple**
Pica (10 cpi)	6	12	24
Elite (12 cpi)	5	10	20
Condensed (17.1 cpi)	3.5	7	14

Calculation of the parameters for the BIM data
As the printer cannot recognize ANY command in the BIM data, before printing the graphics, you must define exactly the number of BIM data items that will follow. The graphic commands do this by means of two parameters, which can be calculated in the same way for all resolutions.

These parameters, *n2* and *n1*, are calculated as follows:
n2 = whole number (number of BIM data items divided by 256)
n1 = number of BIM data items- (*n2* x 256)

In other words: *n1* is the remainder of the division of which the quotient is *n2*.

Example: To print a full line of graphic data in double resolution with an 80-column printer, 960 bytes must be sent after the command **ESC L**.

Parameters ***n1*** and ***n2*** are calculated as follows: *n2* = whole number of (960/256) = 3 *n1* = 960 - (3 x 256) = 960 - 768 = 192

B.2.7.1 The IBM graphic commands are:

- **ESC K *n1 n2* ...** : normal resolution BIM
- **ESC L *n1 n2* ...** : double resolution BIM
- **ESC Y *n1 n2* ...** : double resolution BIM
- **ESC Z *n1 n2*** ... : quadruple resolution BIM
- **ESC [g *n1 n2 m* ...** : High Resolution Graphics

ESC K *n1 n2*

Normal Resolution BIM Hexadecimal code: 1B 4B *n1 n2*

Sets normal resolution graphics (60 dots per inch) for a data string the length of which is defined by parameters ***n1*** and ***n2***.

ESC L *n1 n2*

Double Resolution and Half Speed BIM Hexadecimal code: 1B 4C *n1 n2* ..

Sets double resolution graphics (120 dots per inch), at half speed, for a data string the length of which is defined by parameters ***n1*** and ***n2***.

ESC Y *n1 n2* ...

Double Resolution BIM Hexadecimal code: 1B 59 *n1 n2* ..

Sets double resolution graphics (120 dots per inch), at normal speed, for a data string the length of which is defined by parameters ***n1*** and ***n2***.

The capacity of the line is 960 (1632) data items, but the adjacent horizontal dots cannot be printed.

ESC Z *n1 n2*

Quadruple Resolution BIM Hexadecimal code: 1B 5A *n1 n2*..

Sets quadruple resolution graphics (240 dots per inch), at half speed with respect to **ESC K *n1 n2***, for a data string the length of which is defined by parameters n1 and n2.

The capacity of the line is 1920 (3264) data items, but the horizontal adjacent dots cannot be printed.

ESC [g *n1 n2 m* ...

High Resolution Graphics Hexadecimal code: 1B 5B 67 *n1 n2 m* ..

Selects the graphic printing resolution (BIM with 8 or 24 needles).

Parameters ***n1*** and ***n2*** give the amount of graphic data plus 1 (calculation as for other BIM commands).

Parameter ***m*** defines the type of graphic print resolution according to the following table:

m	Horizontal Resolution	Needles used	Notes
0	60	8	same as ESC K
1	120	8	same as ESC L
2	120	8	same as ESC Y
3	240	8	same as ESC Z
8	60	24	ESC K, high resolution
9	120	24	ESC L, high resolution
11	180	24	Triple density high resolution
12	360	24	Sextuple density high resolution

In high resolution graphics mode (24-needles) each vertical string of dots is controlled by three bytes.

***Note*:** If parameter **m** has the value 2, 3 or 12, the second of horizontal adjacent dots will not be printed.

B.2.7.2 Alternate Graphic Mode (AGM) (ProPrinter X24)

As well as the graphic modes described in the previous section, the printer can also print Epson LQ-800/LQ-1000 compatible graphics, using the Alternate Graphics Mode (AGM) feature.

When the Alternate Graphics Mode feature is selected during the SETUP (***AGM : YES***), the values of command codes **ESC 3**, **ESC J**, and **ESC A** are altered with respect to their standard functions, and the command code **ESC *** is activated.

- **ESC 3 *n*** : Line feed = n/180"
- **ESC A *n*** : Line feed = n/60"
- **ESC J n** : One line feed of n/180" (for graphics)
- **ESC * *m* ...** : AGM graphics mode

ESC 3 *n* **(IBM ProPrinter X24)**

Line Feed - n/180 Hexadecimal code: 1B 33 *n*

n = 1 - 255

If the parameter ***AGM : NO*** has been selected in the SETUP ,it sets the n/216" (0,1176 x n mm) line feed;
If the parameter ***AGM : YES*** has been selected in the SETUP ,it sets the n/180" (0,141 x n mm) line feed.
This is the line feed recommended for graphic printing (BIM). If programmed to 24/216", it ensures that the various lines in 8-needle graphic printing meet perfectly.
It remains valid until a new line feed command is received.
To obtain precise line feeds, always use multiples of 3 for parameter ***n***.

ESC A *n* **(IBM ProPrinter X24)**

Line Feed - n/60" Hexadecimal code: 1B 41 *n*

n = 1 - 85

If the parameter ***AGM : NO*** has been selected in the SETUP ,it sets the n/72" (0,3528 x n mm) line feed; If the parameter ***AGM : YES*** has been selected in the SETUP ,it sets the n/60" (0,432 x n mm) line feed.

It will only be executed when the command **ESC 2** is received. Until then the current line feed remains valid.

Note: *n* = 0 does not change the current line feed.

ESC J *n* (IBM ProPrinter X24)

One line feed of n/180" (for graphics) Hexadecimal code: 1B 4A *n*

n = 1 - 255

Prints the buffer and feeds the paper line feed.If the parameter ***AGM : NO*** has been selected in the SETUP , the paper line feeds by n/216"; If the parameter ***AGM : YES*** has been selected in the SETUP , the paper line feeds by n/180".

It also executes a carriage return, if the parameter ***LF + CR : YES*** has been selected in the SETUP.

The value of ***n*** must be a multiple of 3 (minimum line feed). In 8-needle graphic printing, the value 24/216" ensures that the lines meet perfectly.

ESC * m n1 n2 AGM (IBM ProPrinter X24)

Select Alternate Graphics Mode (AGM) Hexadecimal code: 1B 2A m n1 n2 ...

Allows the selection of 8 or 24-needle graphic mode when ***AGM: YES*** has been selected during SETUP.

Parameter ***m*** defines the type of graphic printing resolution according to the following table:

m	Horizontal Resolution	Needles used	Notes
0	60	8	same as ESC K
1	120	8	same as ESC L
2	120	8	same as ESC Y
3	240	8	same as ESC Z
4	80	8	CRT I
6	90	8	CRT II
32	60	24	ESC K, high resolution
33	120	24	ESC L, high resolution
38	90	24	CRT III
39	180	24	Triple density high resolution
40	360	24	Sextuple density high resolution

Parameters n1 and n2 give the amount of graphic data plus 1 (calculations as for other BIM commands).

Normal and high resolution graphics modes (8 and 24 needles respectively) have the same corresponding bit/needle relationships as those described for the standard graphics mode (see **previous section**).

The vertical dot density is 1/180 in.

Example: box 8x8 dots with center point 2x2 dots, standard density, 8 dots / column
hex: 1B 2A 00 08 00 FF 81 81 99 99 81 81 FF

B.2.8 Downloading Customized Characters (DLL)

If you like, you can create "your own" set of characters, and use it in place of the printer's character set. You can redesign all 256 characters, or just some of them, and load them into the printer's memory (DLL = Down Line Loading) using the command **ESC = ..**.

Each time you can only load characters in ascending code order. If you want to load characters with non-consecutive codes, you must execute the command repeatedly (for each group of characters with consecutive codes).

The area occupied by the characters is 9 dots high and 12 wide (the 12th dot is always a space). The matrix for constructing the characters has 11 columns with 8 dots per column. Eleven bytes (one per column) define the shape of the character. One dot is printed for each bit set to "1" (as in BIM graphics).

Using the DLL command, you can also create graphic symbols and shaded characters. The graphic symbols are automatically expanded from 8 to 12 dots high (by means of the character attribute) during printing. But be careful: the algorithm for creating the NLQ font style and the bold face may not work properly in these cases.

The table of the new characters will be loaded in the printer's RAM. Remember that the content of the RAM is cleared when you switch off the printer, so the DLL characters are also lost. If you want to reuse your DLL characters, you must reload them whenever you power on.

The DLL characters, to be printed, must be preselected using the command **ESC I n** .

Consult the following command:

ESC = : Customized characters (DLL)

ESC = *n1 n2* ID *m*

Customized Characters Hexadecimal code: 1B 3D *n1 n2*..

character defining parameters: (a b NUL p1..p11)k

Enables customized characters to be created and loads them into the printer's RAM.

Parameters ***n1*** and ***n2*** indicate the number of characters to be created and loaded with the current code sequence.

The ID is a fixed value code which must be: **(20)D** for a Draft Font and **(21)D** for a ROMAN Font. (For further information about NLQ DLL characters, see the relevant section of this chapter).
Parameter ***m*** indicates the decimal code of the first of the standard characters to be replaced with customized characters. The customized characters that follow the first are automatically assigned the following decimal codes.

The other parameters define the attributes of the new character and the arrangement of the dots in the character matrix. They must be repeated for each DLL character.

The sequence **ESC = NUL NUL** (or print power-off) clears all DLL characters from the printer's memory and restores the standard character set.

DLL in Draft Print Mode
DLL in NLQ Print Mode
DLL in Draft

- Print Matrix
- Parameters *n1* and *n2*
- Parameter *m2*
- Parameters *a* and *b*
- Parameters *p1* .. *p11*

Example of How to Create a DLL Character

- Print Matrix:

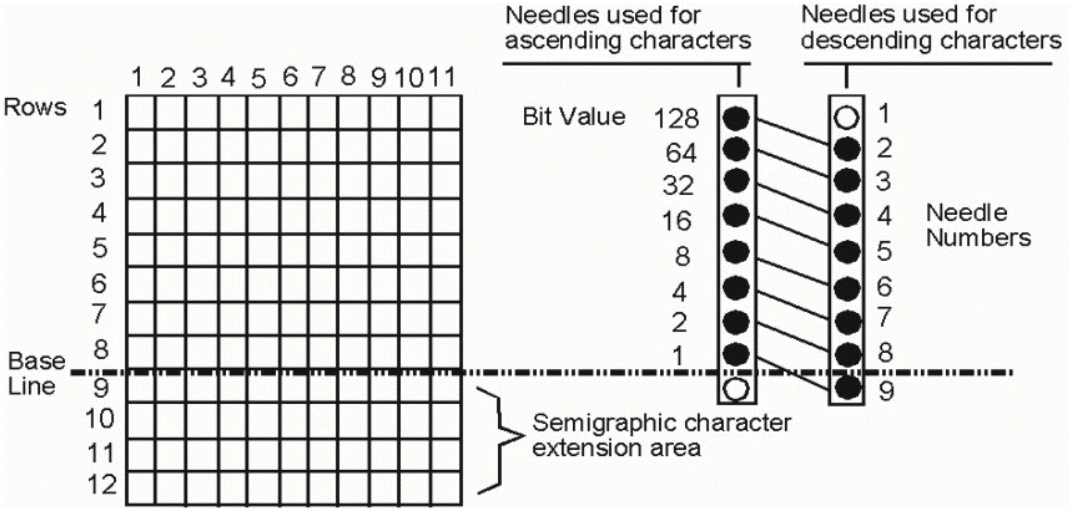


Figure: Draft DLL print matrix

- **Parameters *n1* and *n2***
  These two parameters indicate the total number of bytes that will follow in the sequence.
  They are calculated as follows:
  n2 = whole number of (t divided by 256)
  n1 = remainder of (t divided by 256)
  where t = (number_of_characters x 13) + 2

  Example:
  To redefine characters "A" to "E" (five characters), proceed as follows:
  t = (number_of_characters x 13) + 2 = (5 x 13) +2 = 65 + 2 = 67
  n1 = whole number of (t / 256) = whole number of (67 / 256) = 0
  n2 = remainder of (t / 256) = remainder of (67 / 256) = 67
  05-22 Customized Characters

- **Parameter *m***
  This parameter indicates the decimal code of the first of the standard characters to be replaced with DLL characters.

  Example (continued):
  To redefine characters "A" to "E" (from 65 to 69)D:
  m = A = 65

- **Parameters *a* and *b***
  define the attributes that may be assigned to the new characters.
  They must be specified for each of the characters.
  - **Parameter *a*** indicates whether the character is ascending or descending and whether the character is expanded or not (if it is expanded, it indicates how). The values of the bits of parameter a select the following features:

BIT	Value	Function
7	0 1	Ascending Character Descending Character
6 - 2		ignored
1 - 0	0 1 1 0 0 0	Expanded Character (Bit 7 ignored) Shaded Character (Bit 7 ignored) Normal Character (Bit 7 valid)

If bits 0 and 1 are set to 1 and 0 respectively, the character is expanded to 12 dots; the lines from 9 to 12 will repeat the dots on line 8. These characters can be selected in NLQ.
If bits 0 and 1 are set to 0 and 1 respectively, the character is expanded to 12 dots; the lines from 9 to 12 will repeat the dots of the base of the character of lines 1-4 (for shaded characters as characters with code 176-178). These characters cannot be selected in NLQ.
If both bits 0 and 1 are set to 1 (error), the printer will automatically correct these values to 0, 0 (normal character).

- **Parameter *b*** indicates whether proportional spacing is used or not. The values of the bits of parameter b select the following features:

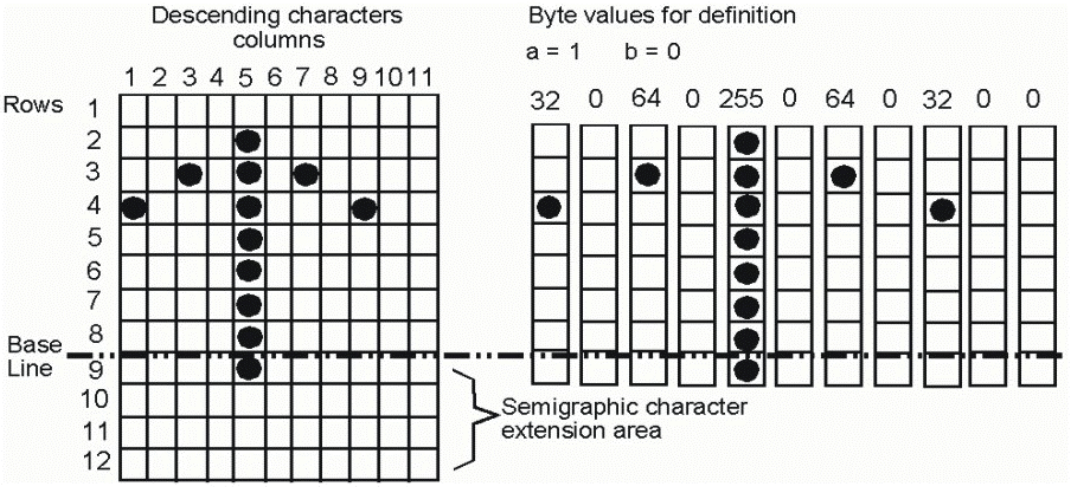
Bit	Value	Function
7		ignored
6 - 4	variable	Binary number indicates the column number of the matrix where the character starts (max value = 7).
3 - 0	variable	Binary number indicates the number of columns occupied by the character, the width of the character.Values > 11 are set to 11.

If the character has FIXED spacing, all the bits must be set to ZERO. If a character created with fixed spacing is printed in proportional spacing, it will occupy all 11 columns of the character matrix. Irrespective of the printing mode selected, a twelfth column will always be added to space out the characters.

- **Parameters p1 .. p11**
  These 11 bytes determine the dots in the columns for forming the character. As in BIM graphic printing, each bit in the various bytes corresponds to a needle of the print head, and a dot will be printed for each bit set to 1.

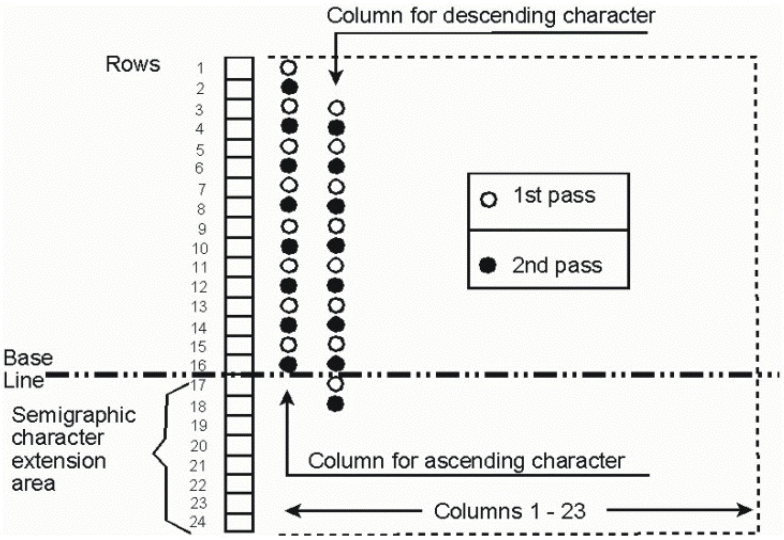
  Example of How to Create a DLL Character
  This example shows how to replace the character 2@`0 (64D) with the "up arrow". The arrow is a descending character with fixed spacing. The values of the parameters are therefore as follows:

  t = (1 x 13) + 2 = 15
  n1 = 15
  n2 = 0
  m = (64)D
  a = (128)D
  b = 0
  p1 = (32)D; p2 = (0)D; p3 = (64)D; p4 = (0)D; p5 = (255)D;
  p6 = (0)D; p7 = (64)D; p8 = (0)D; p9 = (32)D; p10 = (0)D; p11 = (0)D.



The customized character (up arrow) is loaded into the printer's memory by the following escape sequence:
(27)D; (61)D; (15)D; (0)D; (20)D; (64)D; (128)D; (0)D; (32)D; (0)D; (64)D; (0)D; (255)D; (0)D; (64)D; (0)D; (32)D; (0)D; (0)D .

- **DLL in NLQ**
  DLL characters can also be defined in NLQ SANS SERIF font. The method for creating them differs from the Draft DLL character creation method on the following points:
  1. The ID byte must be (21)D.
  2. Each character requires 48 bytes for its definition (2 bytes for the attributes and 46 for the shape).
  3. The matrix of an NLQ DLL character is printed in two passes (23 columns per pass). The order of the bytes for defining a character is therefore as follows:
     byte 1 : Attribute a
     byte 2 : Attribute b
     byte 3 : 1st column of 1st pass; byte 4 : 1st column of 2nd pass; byte 5 : 2nd column of 1st pass; byte 6 : 2nd column of 2nd pass
     .. byte 47 : 23rd column of 1st pass; byte 48 : 23rd column of 2nd pass.



  4. For shaded and expanded characters, attribute ***a*** has the same meaning as for Draft DLL. But for shaded characters, lines 1, 3, 5 and 7 are copied on the lines at the bottom 17, 19, 21 and 23. For expanded characters (semigraphic), line 15 is copied on lines 17, 19, 21 and 23 and line 16 is copied onto lines 18, 20, 22, and 24.
  5. All the bits of the attribute "b" byte will be set to zero, because proportional spacing is not possible for the ROMAN font.

Note: Horizontal adjacent dots cannot normally be printed; they can be in bold face printing.
If you define consecutive dots, place them in the odd positions of the matrix (3, 5, 7 ..) to obtain characters that can also be printed correctly when printing from right to left.

B.2.9 Other Functions

- **CAN** : Clear print buffer
- **DC1** : Activate printer-system connection
- **DC3** : Deactivate printer-system connection
- **ESC 5 n** : Automatic line feed after CR
- **ESC 6** : Table 2 of character set
- **ESC 7** : Table 1 of character set
- **ESC \ *n1 n2*** : Print characters from table 3
- **ESC ^** : Print a character from table 3
- **ESC BEL E** : Change emulation
- **ESC Q ETX** : Deactivate printer-system connection

CAN

Clear Buffer Hexadecimal code: 18

Clears the contents of the print buffer; all the data is lost.
The current printing position remains unchanged.

DC1

Activate Printer-System Connection Hexadecimal code: 11

Sets the printer "on-line" until a **DC3** is received.

DC3

Deactivate Printer-System Connection Hexadecimal code: 13

The printer sends this command via the serial interface to indicate that the buffer is full.
With a parallel interface, it is considered a **NUL**.

ESC 5 *n*

Automatic Line Feed after CR Hexadecimal code: 1B 35 *n*

Sets/cancels the execution of an automatic line feed when a CR is received. It takes priority over the setting made in the SETUP.

n = 1 (1 or 49)D: automatic LF after CR (CR=CR+LF).
n = 0 (0 or 48)D: no automatic LF after CR (CR=CR).

ESC 6

Table 2 of Character Set Hexadecimal code: 1B 36

Selects table 2 of the character set with the complete set of national characters (default setting).

It takes priority over the setting made in the SETUP.

ESC 7

Table 1 of Character Set Hexadecimal code: 1B 37

Selects table 1 of the character set (see the Command Interpreter and Character Sets section), which repeats the control codes in the code positions 128-159.

It takes priority over the setting made in the SETUP.

ESC \ *n1 n2*

Print Characters from Table 3 Hexadecimal code: 1B 5C *n1 n2*

Enables printing of the symbols present in the positions that normally represent control codes.

This command tells the printer to ignore the function of the commands for the codes between 0 and 32 (and, with table 1 selected, also between 128 and 159) and to print the substitute symbols present in these positions.

Parameters ***n1*** and ***n2*** indicate the number of characters to be printed in this way. They are calculated as follows:

n2 = whole number (number of data items/256)
n1 = number of data items - (n2 x 256)

Having printed the number of symbols determined by parameters n1 and n2, the printer resumes normal operation using the preselected character set (table 1 or 2). The function of control codes 0-32 (and 128-158) is restored and the function of this command ceases.

ESC ^

Print a Character from Table 3 Hexadecimal code: 1B 5E

Has the same function as the command **ESC \ ..**, but only enables one character to be printed, the one that follows the command.

ESC Q ETX

Deactivate Printer-System Connection Hexadecimal code: 1B 51 03

Sets the printer **off-line** (in LOCAL mode), until the **DC1**, which restores the connection, is received.

The third element in the sequence **ETX** identifies the model of printer connected (80-column printer).

B.3 Hex - Decimal Conversion Table

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0	0	16	32	48	64	80	96	112	128	144	160	176	192	208	224	240
1	1	17	33	49	65	81	97	113	129	145	161	177	193	209	225	241
2	2	18	34	50	66	82	98	114	130	146	162	178	194	210	226	242
3	3	19	35	51	67	83	99	115	131	147	163	179	195	211	227	243
4	4	20	36	52	68	84	100	116	132	148	164	180	196	212	228	244
5	5	21	37	53	69	85	101	117	133	149	165	181	197	213	229	245
6	6	22	38	54	70	86	102	118	134	150	166	182	198	214	230	246
7	7	23	39	55	71	87	103	119	135	151	167	183	199	215	231	247
8	8	24	40	56	72	88	104	120	136	152	168	184	200	216	232	248
9	9	25	41	57	73	89	105	121	137	153	269	185	201	217	233	249
A	10	26	42	58	74	90	106	122	138	154	170	186	202	218	234	250
B	11	27	43	59	75	91	107	123	139	155	171	187	203	219	235	251
C	12	28	44	60	76	92	108	124	140	156	172	188	204	220	236	252
D	13	29	45	61	77	93	109	125	141	157	173	189	205	221	237	253
E	14	30	46	62	78	94	110	126	142	158	174	190	206	222	238	254
F	15	31	47	63	79	95	111	127	143	159	175	191	207	223	239	255

Appendix C EPSON LQ-Emulation Commands

Characters used in control functions appear in monospaced type. The table below explains some of the conventions used.

A pair of numbers separated by a slash (/) character indicates Column/Row notation. This notation refers to the location of a character in a standard code table, such as ASCII. (example: 1/B = 1B is the hex-code for Escape)

Spaces appear between characters in sequence for clarity; they are not part of the format.

At the begin of this chapter you will find a listing of the LQ Emulation commands classified by Hex Code and at the end a Hex - Decimal conversion table.

The following conventions are used in the command listings:

Conventions:

ESC	Escape (1/B), introduces an escape sequence.
P*n*	Numeric parameter, or number of units that specify a distance or quantity pertaining to the escape sequence, control function or control string. Accepted values are 0...9999, may be preceded by + or -. If the parameter is in normal notation like "200" the programming in hex-code is according to a ASCII table. ("200" = 32,30,30 in hex).
n1..n2..n3....nn	A series of parameters pertaining to the escape sequence, control function or control string.
*	Indicates multiplied by

C.1 Command Index (By Code)

Note: **Ignored** in column **FUNCTION** means the command is treated as **NOP**, that means, according to defined command format all bytes of this command are discarded.

COMMAND	HEX VALUE	FUNCTION
BEL	07	Beep
BS	08	Backspace
HT	09	Horizontal Tabulation
LF	0A	Line feed
VT	0B	Vertical Tabulation
FF	0C	Form feed for fanfold paper or eject paper for cut sheet
CR	0D	Carriage return
SO	0E	Set double width (one line).
SI	0F	Set condensed printing in western mode
DLE B	10 42	Soft reset
DC1	11	On line (Ignored)
DC2	12	Cancel condensed printing for ASCII
DC3	13	Off line (Ignored)
DC4	14	Reset double width for current line.
CAN	18	Cancel line buffer
ESC BEL n	1B 07 n	Change current emulation
ESC SO	1B 0E	Set double width (one line)
ESC SI	1B 0F	Set condensed printing for ASCII
ESC EM n	1B 19 n	Control paper loading/ejecting (Ignored)
ESC SP n	1B 20 n	Adds extra space between each character
ESC ! n	1B 21 n	Master select
ESC $ n1 n2	1B 24 n1 n2	Set absolute horizontal print position
ESC % n	1B 25 n	Select user-defined set (invalid on PR)
ESC &	1B 26	Define user-defined characters (Ignored)
ESC (- nL nH m d1 d2...d(nH*256+nL-2) d(nH*256+nL-1)	1B 28 2D nL nH m d1 d2...d (nH*256+nL-2) d(nH*256+nL-1)	Set/reset underline
ESC (C nL nH mL mH d1 d2...d(nH*256+nL-3) d(nH*256+nL-2)	1B 28 43 nL nH mL mH d1 d2...d(nH*256+nL-3) d(nH*256+nL-2)	Set page length in defined unit

ESC (G nL nH m d1 d2...d(nH*256+nL-2) d(nH*256+nL-1)	1B 28 47 nL nH m d1 d2...d(nH*256+nL-2) d(nH*256+nL-1)	Select graphics mode (Ignored)
ESC (U nL nH m d1 d2...d(nH*256+nL-2) d(nH*256+nL-1)	1B 28 55 nL nH m d1 d2...d(nH*256+nL-2) d(nH*256+nL-1)	Set vertical unit (m/3600 inch)
ESC (V nL nH mL mH d1 d2...d(nH*256+nL-3) d(nH*256+nL-2)	1B 28 56 nL nH mL mH d1 d2...d(nH*256+nL-3) d(nH*256+nL-2)	Set absolute vertical print position
ESC (X nL nH d1 d2...d(nH*256+nL-1) d(nH*256+nL)	1B 28 58 nL nH d1 d2...d(nH*256+nL-1) d(nH*256+nL)	Set background printing (Ignored)
ESC (^ n1 n2	1B 28 5E n1 n2	Treat the defined data to be printable character (Ignored)
ESC (c nL nH d1 d2...d(nH*256+nL-1) d(nH*256+nL)	1B 28 63 nL nH d1 d2...d(nH*256+nL-1) d(nH*256+nL)	Set TOF and BOF (Ignored)
ESC (t nL nH d1 d2...d(nH*256+nL-1) d(nH*256+nL)	1B 28 74 nL nH d1 d2...d(nH*256+nL-1) d(nH*256+nL)	Assign character table (Ignored)
ESC (v nL nH mL mH d1 d2...d(nH*256+nL-3) d(nH*256+nL-2)	1B 28 43 nL nH mL mH d1 d2...d(nH*256+nL-3) d(nH*256+nL-2)	Set relative vertical print position
ESC * n1 n2 n3...data	1B 2A n1 n2 n3...data	Set AGM graphic mode
ESC + n	1B 2B n	Set n/360-inch line spacing
ESC - n	1B 2D n	Set/Reset underline
ESC / n	1B 2F n	Select vertical tab channel(set)
ESC 0	1B 30	Set 8 LPI
ESC 2	1B 32	Set 6 LPI
ESC 3 n	1B 33 n	Set n/180-inch line spacing
ESC 4	1B 34	Select italic font
ESC 5	1B 35	Cancel italic font
ESC 6	1B 36	Enable printing of upper control codes (Ignored)
ESC 7	1B 37	Enable upper control codes
ESC : n1 n2 n3	1B 3A n1 n2 n3	Copy ROM to RAM (Ignored)
ESC <	1B 3C	Unidirectional mode (Ignored)
ESC @	1B 40	Initialize printer (without HW movement)

ESC A n	1B 41 n	Set n/60-inch line spacing
ESC B n_1…n_i Nul	1B 42 n_1…n_i 00	Set vertical tabs
ESC C NUL n	1B 43 00 n	Set page length in inches
ESC C n	1B 43 n	Set page length in lines
ESC D n_1…n_i Nul	1B 44 n_1…n_i 00	Set table horizontally
ESC E	1B 45	Select bold font
ESC F	1B 46	Cancel bold font
ESC G	1B 47	Select double-strike printing
ESC H	1B 48	Cancel double-strike printing
ESC I n	1B 78 n	Set extended character attributes
ESC J n	1B 4A n	Advance print position vertically
ESC K nH nL d1 d2 ...d(nH*256+nL-1) d(nH*256+nL)	1B 4B nH nL d1 d2 ...d(nH*256+nL-1) d(nH*256+nL)	Set 60dpi 8 needles graphic printing mode
ESC L nH nL d1 d2 ...d(nH*256+nL-1) d(nH*256+nL)	1B 4C nH nL d1 d2 ...d(nH*256+nL-1) d(nH*256+nL)	Set 120dpi 8 needles graphic printing mode
ESC M	1B 4D	Select 12-cpi for ASCII
ESC N n	1B 4E n	Set bottom margin
ESC O	1B 4F	Cancel bottom margin
ESC P	1B 50	Select 10-cpi for ASCII
ESC Q n	1B 51 n	Set right margin
ESC R n	1B 52 n	Select codepage
ESC S n	1B 53 n	Select superscript/subscript printing for ASCII
ESC T	1B 54	Cancel superscript/subscript printing for ASCII
ESC U n	1B 55 n	Set unidirectional or bidirectional printing
ESC W n	1B 57 n	Set/reset double width printing
ESC X n1 n2 n3	1B 58 n1 n2 n3	Ignored
ESC Y nH nL d1 d2 ...d(nH*256+nL-1) d(nH*256+nL)	1B 59 nH nL d1 d2 ...d(nH*256+nL-1) d(nH*256+nL)	Set 120dpi 8 needles graphic printing mode
ESC Z nH nL d1 d2 ...d(nH*256+nL-1) d(nH*256+nL)	1B 5A nH nL d1 d2 ...d(nH*256+nL-1) d(nH*256+nL)	Set 240dpi 8 needles graphic printing mode
ESC \ n1 n2	1B 5C n1 n2	Set relative horizontal print position
ESC a n	1B 61 n	Select justification (Ignored)
ESC b n	1B 62 n	Set vertical tabs in VFU channels
ESC c n1 n2	1B 63 n1 n2	Ignored
ESC g	1B 67	Select 15-cpi for ASCII
ESC j n	1B 6A n	Reverse paper feed

ESC k n	1B 6B n	Select typeface
ESC l n	1B 6C n	Set left margin
ESC p n	1B 70 n	Turn proportional mode on/off
ESC q n	1B 71 n	Select character style (Ignored)
ESC t n	1B 74 n	Set/reset italic font
ESC w n	1B 77 n	Set/reset double height
ESC x n	1B 78 n	Set printing quality
DEL	7F	Delete a character

C.2 Command Description (by function)

When you select the ***EMULATION: IBM ProPrinter II*** or **IBM ProPrinter X24** parameter in the setup, the machine interprets all the commands of the IBM ProPrinters, grouped by their functions, as follows:

- **Basic Operations**
- **Margins**
- **Line Feed**
- **Print Position**
- **Print Pitches**
- **Print Attributes**
- **Tabulation**
- **Graphics**
- **Other Functions**
- **Ignored Commands**

C.2.1 Basic Operations

Before printing the printer stores the image of a line in the print buffer. All the commands concerning this section result in immediate printing of the buffer contents.

- **BEL**: Beep
- **BS** : Backspace
- **CR** : Carriage return
- **FF** : Form feed

BEL **Beep**

This command causes the buzzer to sound one time.

Hex: (07)H
Decimal: (07)D
Octal: (07O

BS **Backspace**

This command causes the horizontal print position to move left one character space (according to the active character pitch and character space).

Hex: (08)H
Decimal: (08)D
Octal: (10)O

Note: If movement is beyond the left margin, it will position on the left margin.)

CR **Carriage Return**

This command causes the current line buffer to print and position the print head to the left margin.

Hex: (0D)H
Decimal: (13)D
Octal: (15)O

FF **Form Feed (Eject)**

This command causes the current line buffer to print and eject paper (for cut form) or executes a form feed (for fanfold paper).

Hex: (0C)H
Decimal: (12)D
Octal: (14)O

C.2.2 Margins

- **ESC (C ...** : Set page length
- **ESC C NUL *n*** : Set page length in inches
- **ESC C *n***: Set page length as ***n*** lines
- **ESC l *n*** : Set Left Margin
- **ESC N *n*** : Bottom of form
- **ESC O** : Cancel bottom margin
- **ESC Q *n*** : Set Right Margin as *n* Characters
- **ESC (U ...** : Set vertical resolution

ESC (C *nL nH mL mH* **Set page length**

- (nH * 256 + nL) defines the number of following bytes in this command.

- Command **ESC (C 0x02 0x00 mL mH** defines the page length as (mH * 256 + mL) * vertical resolution.
- The vertical resolution is set by command **ESC (U *nL nH m***. The default is 1/360"
- Others ignore this command (all bytes of this command are ignored).

Hex: (1B 28 43 nL nH mL mH)H
Decimal: (27 40 67 nL nH mL mH)D
Octal: (33 50 103 nL nH mL mH)O

ESC C NUL *n* **Set Page Length as n Inch**

Set page length as ***n*** inches.

Hex: (1B 43 0 n)H
Decimal: (27 67 0 n)D
Octal: (33 103 0 n)O

ESC C *n* **Set Page Length as n lines**

Set page length as ***n*** lines

Hex: (1B 43 n)H
Decimal: (27 67 n)D
Octal: (33 103 n)O

ESC I *n* **Set Left Margin**

Sets the left margin to n columns in the current character pitch.

Hex: (1B 5C n)H
Decimal: (27 108 n)D
Octal: (33 154 n)O

ESC N *n* **Set Bottom Margin as *n* Lines**

Sets the bottom margin as ***n*** lines

Hex: (1B 4E-n)H
Decimal: (27 78 n)D
Octal: (33 116 n)O

ESC O **Cancel Bottom Margin**

Cancel bottom margin

Hex: (1B 4F)H
Decimal: (27 79)D
Octal: (33 117)O

ESC Q *n* **Set Right Margin as *n* Characters**

Set right margin as ***n*** characters, the width of character depends on the current mode character attributes.

Hex: (1B 51 n)H
Decimal: (27 81 n)D
Octal: (33 121 n)O

ESC (U *nL nH m* **Set vertical resolution as *m* / 3600 inch**

Set vertical resolution

Hex: (1B 28 55 nL nH m)H
Decimal: (27 40 85 nL nH m)D
Octal: (33 50 125 nL nH m)O

Command **ESC (U** 0x01 0x00 ***m*** (***m*** = 10,20,30,40,50,60) sets vertical resolution as: ***m*** / 3600 inch.

C.2.3 Line Feed

- **ESC 0** : Line feed = 1/8"
- **ESC 2** : Line feed = 1/6"
- **ESC 3 *n*** : Set line spacing as n/180 inch
- **ESC A *n*** : Set line spacing as n/6 inch
- **ESC J *n*** : Advance *n* / 180 inch vertically
- **ESC j *n*** : Reverse Feed Paper *n* / 180 inch
- **ESC + *n*** : Set line spacing as n/360 inch
- **LF** : Line feed

ESC 0 **Set 8 LPI**

Sets the 1/8" (3.175 mm) line feed. Set 8 LPI

Hex: (1B 30)H
Decimal: (27 48)D
Octal: (33 60)O

ESC 2 **Set 6 LPI**

Set the 1/6" (4.23 mm) line feed.

Hex: (1B 32)H
Decimal: (27 50)D
Octal: (33 62)O

ESC 3 *n* **Set Line spacing as n/180 inch**

Set line spacing as n/180 inch.

Hex: (1B-33-n)H
Decimal: (27-51-n)D
Octal: (33-63-n)O

ESC A *n* **Set Line Spacing as n/6 inch**

Set line spacing as *n*/60 inch.

Hex: (1B 41 n)H
Decimal: (27 65 n)D
Octal: (33 101 n)O

ESC J *n* **Advance *n* / 180 inch vertically**

Advances the vertical print position

Hex: (1B 4A n)H
Decimal: (27 74 n)D
Octal: (33 112 n)O

Advances the vertical print position ***n*** / 180 inch
The value of n should be **01**H - **FF**H (1D - 255D).

ESC j *n* **Reverse Feed Paper *n* / 180 inch**

Reverse paper feed

Hex: (1B 6A n)H
Decimal: (27 106 n)D
Octal: (33 152 n)O

This command prints data in the buffer, then reverse feed paper ***n*** / 180 inch, the value of n is in **01**H - **FF**H (1D - 5D).

ESC + *n* **Set Line Spacing as n/360 inch**

Set line spacing as *n*/360 inch.

Hex: (1B 2B n)H
Decimal: (27 43 n)D
Octal: (33 53 n)O

LF **Line feed**

This command prints the current line buffer and move the current vertical position to the next printing line (using the existing line pitch).

Hex: (0A)H
Decimal: (10)D
Octal: (12)O

C.2.4 Print Position

- **ESC (V ...** : Set absolute vertical print position
- **ESC (v ...** : Set relative vertical print position
- **ESC $ ...** : Set absolute vertical print position
- **ESC \ *n1 n2*** : Set relative horizontal print position

ESC (V *nL nH mL mH* **Set absolute vertical print position**

Hex: (1B 28 56 nL nH mL mH)H
Decimal: (27 40 86 nL nH mL mH)D
Octal: (33 50 126 nL nH mL mH)O

The command **ESC (V 0x02 0x00 mL mH**, move the print position to:
(mH * 256 + mL) * vertical resolution.

Note: With other coding this command will be ignored.

ESC (v *nL nH mL mH* **Set relative vertical print position**

Hex: (1B 28 76 nL nH mL mH)H
Decimal: (27 40 186 nL nH mL mH)D
Octal: (33 50 166 nL nH mL mH)O

The command **ESC (v 0x02 0x00 mL mH** move down vertically
(mH * 256 + mL) * (vertical resolution) from current position.

Note: With other coding this command will be ignored.

ESC $ *n1 n2* **Set absolute horizontal printing position**

Set absolute print position

Hex: (1B-24-n1-n2)H
Decimal: (27-36-n1-n2)D
Octal: (33-44-n1-n2)O

Set absolute print position as (***n2*** * 256 + ***n1***)/60 inch or (***n2*** * 256 + ***n1***)
(horizontal unit/3600) according to **PNS** setting in menu.

ESC \ *n1 n2* **Set Relative Horizontal Printing Position**

Set relative horizontal printing position

Hex: (1B 5C n1 n2)H
Decimal: (27 92 n1 n2)D
Octal: (33 134 n1 n2)O

The defined unit will be different according to print quality and PNS item in menu:
Draft: move (***n2*** * 256 + ***n1***)/120 inch from the current position
LQ: move (***n2*** * 256 + ***n1***)/180 inch(**ESC/P**) or (***n2*** * 256 + ***n1***) (horizontal unit/3600) inch (**ESC/P 2**) from the current position.

Note: If this command is received consecutively , the consecutive (***n2*** * 256 + ***n1***) will be accumulated and sets the low 15 bits as valid movement parameter.

C.2.5 Print Pitches

- **DC2**: Cancel condensed printing for ASCII
- **ESC M** : Set character to be 12 CPI
- **ESC P** : Set character to be 10 CPI
- **ESC SI** : Set condensed printing of character
- **ESC g** : Set 15 CPI for character
- **SI**: Set character condensed printing

DC2 **Cancel condensed printing for ASCII**

Cancel condensed printing for ASCII.

Hex: (12)H
Decimal: (18)D
Octal: (22)O

ESC M **Set Character to 12 CPI**

Set character to be 12 CPI

Hex: (1B 4D)H
Decimal: (27 77)D
Octal: (33 115)O

ESC P **Set Character to 10 CPI**

Set character to be 10 CPI

Hex: (1B-50)H
Decimal: (27-80)D
Octal: (33-120)O

ESC SI **Set condensed printing of character**

This command sets character to be printed in condensed mode (60% width).

Hex: (1B 0F)H
Decimal: (27 15)D
Octal: (33 17)O

ESC g **Set Character to 15 CPI**

Set 15 CPI for character

Hex: (1B-67)H
Decimal: (27-103)D
Octal: (33-147)O

SI **Set character condensed printing**

This command causes to print character as condensed (60% width).

Hex: (0F)H
Decimal: (15)D
Octal: (17)O

C.2.6 Print Attributes

- **DC4** : Reset double width printing (one line)
- **ESC E** : Set bold font
- **ESC F** : Reset bold font
- **ESC G** : Set double strike printing
- **ESC H** : Reset double strike printing
- **ESC I *n*** : Set extended attributes of character
- **ESC S *n*** : Set subscript / superscript in western character
- **ESC SO** : Set double width (one line)
- **ESC SP *n*** : Set western CPI
- **ESC T** : Reset subscript / superscript in western character
- **ESC U *n*** : Set unidirectional / bidirectional printing
- **ESC W *n*** : Set / Reset double width
- **ESC p *n*** : Set / Reset Character Proportion
- **ESC t *n*** : Set / Reset Italic Printing
- **ESC w *n*** : Set / Reset Double Height Printing
- **ESC x *n*** : Set Character Quality
- **ESC - *n*** : Set / Reset the underline of western character
- **ESC ! *n*** : Set general attributes of western character
- **ESC 4** : Set italic printing
- **ESC 5** : Reset italic printing
- **ESC (- ...** : Set underline
- **SO** : Double width (one line)

DC4 **Reset double width printing**

Reset double width printing for one line

Hex: (14)H
Decimal: (20)D
Octal: (24)O

ESC E **Set bold font**

Set bold font

Hex: (1B 45)H
Decimal: (27 69)D
Octal: (33 105)O

ESC F **Reset bold font**

Reset bold font

Hex: (1B 46)H
Decimal: (27 70)D
Octal: (33 106)O
Reset bold font

ESC G **Set double strike printing**

Set double strike printing

Hex: (1B 47)H
Decimal: (27 71)D
Octal: (33 107)O

ESC H **Reset double strike printing**

Reset double strike printing

Hex: (1B 48)H
Decimal: (27 72)D
Octal: (33 110)O

ESC I *n* **Set extended attributes of character**

Set extended attributes of character

Hex: (1B 49 n)H
Decimal: (27 73 n)D
Octal: (33 11 n)O

n = 'A': Reset double height and width in character.
n = 'B': Set double width character.
n = 'C': Reset double width character .
n = 'D': Set double width character.

ESC S *n* **Set subscript/superscript character**

Set subscript/superscript in character

Hex: (1B 53 n)H
Decimal: (27 83 n)D
Octal: (33 123 n)O

n = 0: Set superscript character
n = 1: Set subscript character

ESC SO **Set double width (one line)**

This command sets the printable character to be printed horizontally enlarged (double width), it is valid only for one line.

Hex: (1B 0E)H
Decimal: (27 14)D
Octal: (33 16)O

ESC SP *n* **Set CPI**

Set character pitch of character.
In draft, the character width will be set as **n**/120 inch, or else it will be set as **n**/180 inch.

Hex: (1B 20 n)H
Decimal: (27 32 n)D
Octal: (33 40 n)O

ESC T **Reset subscript / superscript character**

Reset subscript / superscript character.

Hex: (1B 54)H
Decimal: (27 84)D
Octal: (33 124)O

ESC U *n* **Set unidirectional / bidirectional printing**

Set unidirectional / bidirectional printing.

Hex: (1B 55 n)H
Decimal: (27 85 n)D
Octal: (33 125 n)O

n = 0: Set bidirectional printing
n = 1: Set unidirectional printing

ESC W *n* **Set / Reset double width**

Set / Reset double width.

Hex: (1B 57 n)H
Decimal: (27 87 n)D
Octal: (33 127 n)O

n = 0: Reset double width
n = 1: Set double width

ESC p *n* **Set / Reset Character Proportion**

Set / Reset character proportion

Hex: (1B 70 n)H
Decimal: (27 112 n)D
Octal: (33 160 n)O

n = 0: Reset character proportion
n = 1: Set character proportion

ESC t *n* **Set / Reset Italic Printing**

Set / Reset italic printing

Hex: (1B 74 n)H
Decimal: (27 116 n)D
Octal: (33 164 n)O

n = 0: Reset italic printing
n = 1: Set italic printing

ESC w *n* **Set / Reset Double Height Printing**

Set / Reset double height printing

Hex: (1B 77 n)H
Decimal: (27 119 n)D
Octal: (33 167 n)O

n = 0: Reset double height printing
n = 1: Set double height printing

ESC x *n* **Set Character Quality**

Set character quality

Hex: (1B 78 n)H
Decimal: (27 120 n)D
Octal: (33 170 n)O

n = 0: print in draft
n = 1: print in NLQ

Note: The **CHARACTER DEFINITION** must be set to **LQ**.

ESC - *n* **Set / Reset the underlined character**

Set / Reset the underlined character.

Hex: (1B 2C n)H
Decimal: (27 44 n)D
Octal: (33 54 n)O

n = 0: Reset the underlined character
n = 1: Set the underlined character

ESC ! *n* **Set general attributes of character**

Set general attributes of character.

Hex: (1B 21 n)H
Decimal: (27 33 n)D
Octal: (33 41 n)O

The general attributes of character according to the value of ***n*** :

Bit of *n*	***0***	***1***
7	*reset subscript*	*set subscript*
6	*reset italic*	*set italic*
5	*reset double width*	*set double width*
4	*reset overtype*	*set overtype*
3	*reset boldface*	*set boldface*
2	*reset condensed character*	*Set condensed character*
1	*reset character proportion*	*set character proportion*
0	*reset CPI as 12*	*set CPI as 12*

ESC 4 ***Set italic printing***

Set italic printing

Hex: (1B 34)H
Decimal: (27 52)D
Octal: (33 64)O

ESC 5 Reset italic printing

Reset italic printing

Hex: (1B 35)H
Decimal: (27 53)D
Octal: (33 65)O

ESC (- nL nH m d1 d2 **Set underline**

Set underline

Hex: (1B 28 2D nL nH m d1 d2)H
Decimal: (27 40 45 nL nH m d1 d2)D
Octal: (33 50 55 nL nH m d1 d2)O

(***nH*** * 256 + ***nL***) defines the number of following data in this command.

ESC (- 0x03 0x00 0x01 0x01 d2 (d2 not 0) set underline in mode
ESC (- 0x03 0x00 0x01 d1 0x00 (d1 not 0) reset underline in mode

Else, ignore this command (including (***nH*** * 256 + ***nL***) bytes behind ***nH***).

SO **Set double-width printing**

This command causes to print the printable character behind it as horizontally enlarged (double width). This command is only valid for one line.

Hex: (0E)H
Decimal: (14)D
Octal: (16)O

C.2.7 Tabulation

- **ESC B ...** : Set vertical tab stops of tab set
- **ESC D ...** : Set horizontal tab stops
- **ESC b ...** : Set vertical tab stops in tab set
- **ESC / *n*** : Select the current vertical tab set
- **HT** : Horizontal tabulation
- **VT** : Vertical tabulation

ESC B *n1* ... *nk* NUL **Set Tab Stop of Vertical Tab Set 0**

Set vertical tab stops at the lines specified by ***n1*** to ***nk*** (in the current line spacing) in tab set 0, as measured from the top-of-form position. Tab stop must be in ascending order, code NUL (0x00) will end this command.

A maximum of 16 vertical tab stops can be set for each tab set.

Hex: (1B 42)H
Decimal: (27 66)D
Octal: (33 102)O

ESC D *n1* ... *nk* NUL **Set Horizontal Tab Stop**

Set horizontal tab stops (in the current character pitch) at the columns specified by ***n1*** to ***nk***, as measured from the left-margin position. Tab stop must be in ascending order, code NUL (0x00) will end this command.

A maximum of 30 horizontal tab stops can be set.

Hex: (1B 44)H
Decimal: (27 68)D
Octal: (33 104)O

ESC / *n* **Select vertical tab set**

Select the current vertical tab set.

Hex: (1B 2f n)H
Decimal: (27 47 n)D
Octal: (33 57 n)O

n = 0 up to 7

ESC b *n m1* … *mk* NUL **Set Vertical Tab in Tab Set *n***

Sets vertical tab stops at the lines specified by ***m1*** to ***mk*** (in the current line spacing) in tab set n as measured from the top-of-form position. The tab stops must be in ascending order.

A maximum of 16 vertical tab stops can be set in each tab set

Hex: (1B 61 n m1 … mk 00)H
Decimal: (27 97 n m1 … mk 00)D
Octal: (33 141 n m1 … mk 00)O

HT **Horizontal Tabulation**

This command moves the horizontal position to the right to the next horizontal tab stop. If there is no tab stop between the current position and the right margin, this command will be ignored or executed as a **CR + LF** according to menu setup.

Hex: (09)H
Decimal: (09)D
Octal: (11)O

VT **Vertical Tabulation**

This command causes the current position to move down to the next vertical tab stop. If there is no tab stop beyond the current position, the printer executes this command as **CR + LF.**

Hex: (0B)H
Decimal: (11)D
Octal: (13)O

C.2.8 Graphics

- **ESC K *n1 n2* ...** : Normal resolution graphic printing mode
- **ESC L *n1 n2* ...** : Double resolution graphic printing mode
- **ESC Y n1 n2 ...** : Double resolution graphic printing mode
- **ESC Z *n1 n2* ..** : Quadruple resolution graphic printing mode
- **ESC * *m n1 n2* ...** : Set AGM print mode

ESC K *n1 n2* ..data .. Set 60 DPI 8 Needles Graphic Printing Mode

Set graphic print mode to normal resolution. Prints bit image graphics in 8-dot columns, at 60 DPI

Hex: (1B 4B n1 n2 ..)H
Decimal: (27 75 n1 n2 ..)D
Octal: (33 113 n1 n2 ..)O

(***n1*** + * 256) specify the total number of columns of graphics data following,

Note: The **CHARACTER DEFINITION** must be set to **LQ**.

ESC L *n1 n2* ..data .. Set 120 DPI 8 Needles Graphic Printing Mode

Set graphic print mode to double resolution. Prints bit image graphics in 8-dot columns, at 120 DPI.

Hex: (1B 4C n1 n2 ..)H
Decimal: (27 76 n1 n2 ..)D
Octal: (33 114 n1 n2 ..)O

(***n1*** + ***n2*** * 256) specify the total number of columns of graphics data following,

ESC Y *n1 n2* ..data .. Set Graphic Printing in 120 DPI 8 Needles

Set graphic print mode to double resolution.

Hex: (1B 59 n1 n2 ..)H
Decimal: (27 89 n1 n2 ..)D
Octal: (33 131 n1 n2 ..)O

Prints bit image graphics in 8-dot columns, 120 DPI at normal speed (consecutive horizontal dots cannot be printed)

(***n1*** + ***n2*** * 256) specify the total number of columns of graphics data following.
A maximum of 960 (1632) columns on one line.

ESC Z *n1 n2* ..data .. Set 240 DPI 8 Needles Graphic Printing

Set quadruple resolution. Prints bit image graphics in 8-dot columns, 240 DPI.

Hex: (1B 5A n1 n2 ..)H
Decimal: (27 90 n1 n2 ..)D
Octal: (33 132 n1 n2 ..)O

(***n1*** + ***n2*** * 256) specify the total number of columns of graphics data following.

A maximum of 960 (1632) columns are on one line.

ESC * *m n1 n2* ...data... Set AGM (Alternate Graphics Mode) print mode

Select 8 needles or 24 needles graphic printing mode

Hex: (1B 2A m n1 n2 …data…)H
Decimal: (27 42 m n1 n2 …data…)D
Octal: (33 52 m n1 n2 …data…)O

m defined the horizontal dot density. As follows:

***m* (Decimal)**	***Dot density DPI***	***Needles used***	***Notes***
0	*60*	*8*	*same as ESC K*
1	*120*	*8*	*same as ESC L*
2	*120*	*8*	*same as ESC Y*
3	*240*	*8*	*same as ESC Z*
4	*80*	*8*	
6	*90*	*8*	
32	*60*	*24*	
33	*120*	*24*	
38	*90*	*24*	
39	*180*	*24*	
40	*360*	*24*	

*(**n1** + **n2** * 256) defines the total columns of graphic data in this command; (1 byte/column for 8 needles mode, 3 bytes/column for 24 needles mode).

C.2.9 Other Functions

- **CAN** : Clear print buffer
- **DLE B** : Soft initialization
- **ESC BEL *n*** : Change emulation
- **ESC R *n*** : Select code table
- **ESC @**

CAN **Clear buffer**

Clear the print buffer

Hex: (18)H
Decimal: (24)D
Octal: (30)O

DLE B **Soft initialization**

This command clears buffer and initializes printer, it sets all the parameters to the power-on default conditions.

Hex: (10 42)H
Decimal: (16 66)D
Octal: (20 102)O

ESC BEL *n* **Change Emulation**

This command causes to print data in the current buffer and change emulation to the corresponding one according to the value of ***n***.

Hex: (1B-07-n)H
Decimal: (27-07-n)D
Octal: (33-07-n)O

n = 'F': Change into **IBM** emulation.
n = 'G': Change into **OKI** emulation.

Note. All other values of ***n*** will be ignored.

ESC R *n* **Select Code Table**

Select country character set in Code Table according to the value of ***n***.

Hex: (1B-52-n)H
Decimal: (27-82-n)D
Octal: (33-122-n)O

n	**Character set**	***n***	**Character set**
0	America	9	Norway
1	France	10	Denmark 2
2	Germany	11	Spain 2
3	U.K.	12	Latin
4	Denmark 1	...	
5	Sweden	...	
6	Italy	75	PC-866-BG(Bulgaria)
7	Spain1	76	PC-Ger.(Germany)

Note: The area of ***n* ≥ 75** is for extended character set.

ESC @ **Software initialization**

Hex: (1B-40)H
Decimal: (27-64)D
Octal: (33-100)O

This command clears buffer and initializes printer, it sets all the parameters to the power-on default conditions.

C.2.10 Ignored Commands

- **DC1** On line
- **DC3** Off line
- **ESC EM ...** : Set form feed controller
- **ESC X ...** :
- **ESC a ...** : Set justification
- **ESC c ...** :
- **ESC k ...** : Set font
- **ESC q ...** : Set/reset shadow font
- **ESC (G ...** : Set raster graphic mode
- **ESC (X ...** : Set background print
- **ESC (c ...** : Set the top and bottom blank of paper
- **ESC (t ...** : Arrange character table
- **ESC (^ ...** : Set print data in character mode
- **ESC <** : Unidirectional mode
- **ESC : ...** : Copy ROM to RAM
- **ESC % ...** : Select character set
- **ESC &** Define character setr
- **ESC 6** : Set printable character
- **ESC 7** : Reset printable character

Note: **Ignored** means the command is treated as **NOP**, that means, according to defined command format all bytes of this command are discarded.

DC1 **On line**

Hex:	(11)H
Decimal:	(17)D
Octal:	(21)O

DC3 **Off line**

Hex:	(13)H
Decimal:	(19)D
Octal:	(23)O

ESC EM *n* **Set form feed controller**

Hex:	(1B 19 n)H
Decimal:	(27 25 n)D
Octal:	(33 31 n)O

ESC X *n1 n2 n3*

Hex: (1B 58 n1 n2 n3)H
Decimal: (27 88 n1 n2 n3)D
Octal: (33 130 n1 n2 n3)O

ESC a *n* **Set justification**

Hex: (1B 61 n)H
Decimal: (27 97 n)D
Octal: (33 141 n)O

ESC c *n1 n2*

Hex: (1B 63 n1 n2)H
Decimal: (27 99 n1 n2)D
Octal: (33 143 n1 n2)O

ESC k *n* **Set font**

Hex: (1B 6B n)H
Decimal: (27 107 n)D
Octal: (33 153 n)O

ESC q *n* **Set/reset shadow font**

Hex: (1B 71 n)H
Decimal: (27 113 n)D
Octal: (33 161)O

ESC (G *nL nH* **Set raster graphic mode**

Hex: (1B 28 47 nL nH)H
Decimal: (27 40 71 nL nH)D
Octal: (33 50 107 nL nH)O
(nH * 256 + nL) defines the number of following bytes in this command

ESC (X *nL nH* **Set background print**

Hex: (1B 28 58 nL nH)H
Decimal: (27 40 88 nL nH)D
Octal: (33 50 130 nL nH)O n)O

ESC (c *nL nH* **Set the top and bottom blank of paper**

Hex: (1B 28 63 nL nH)H
Decimal: (27 40 99 nL nH)D
Octal: (33 50 143 nL nH)O

ESC (^ *n1 n2* **Set print data in character mode**

Hex: (1B 28 5E n1 n2)H
Decimal: (27 40 94 n1 n2)D
Octal: (33 50 136 n1 n2)O

ESC < **Unidirectional Mode**

Hex: (1B 3C)H
Decimal: (27 60)D
Octal: (33 74)O

ESC : *n1 n2 n3* **Copy ROM to RAM**

Hex: (1B 3A n1 n2 n3)H
Decimal: (27 58 n1 n2 n3)D
Octal: (33 72 n1 n2 n3)O

ESC % *n* **Select character set**

Hex: (1B 25 n)H
Decimal: (27 37 n)D
Octal: (33 45 n)O

ESC & **Define character set**

Hex: (1B 26)H
Decimal: (27 38)D
Octal: (33 46)O

ESC (t *nL nH* **Arrange character table**

Hex: (1B 28 74 nL nH)H
Decimal: (27 40 116 nL nH)D
Octal: (33 50 164 nL nH)O

ESC 6 **Set printable character**

Hex: (1B 36)H
Decimal: (27 54)D
Octal: (33 66)O

ESC 7 **Reset printable character**

Hex: (1B 37)H
Decimal: (27 55)D
Octal: (33 67)O

C.3 Hex - Decimal Conversion Table

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0	0	16	32	48	64	80	96	112	128	144	160	176	192	208	224	240
1	1	17	33	49	65	81	97	113	129	145	161	177	193	209	225	241
2	2	18	34	50	66	82	98	114	130	146	162	178	194	210	226	242
3	3	19	35	51	67	83	99	115	131	147	163	179	195	211	227	243
4	4	20	36	52	68	84	100	116	132	148	164	180	196	212	228	244
5	5	21	37	53	69	85	101	117	133	149	165	181	197	213	229	245
6	6	22	38	54	70	86	102	118	134	150	166	182	198	214	230	246
7	7	23	39	55	71	87	103	119	135	151	167	183	199	215	231	247
8	8	24	40	56	72	88	104	120	136	152	168	184	200	216	232	248
9	9	25	41	57	73	89	105	121	137	153	269	185	201	217	233	249
A	10	26	42	58	74	90	106	122	138	154	170	186	202	218	234	250
B	11	27	43	59	75	91	107	123	139	155	171	187	203	219	235	251
C	12	28	44	60	76	92	108	124	140	156	172	188	204	220	236	252
D	13	29	45	61	77	93	109	125	141	157	173	189	205	221	237	253
E	14	30	46	62	78	94	110	126	142	158	174	190	206	222	238	254
F	15	31	47	63	79	95	111	127	143	159	175	191	207	223	239	255